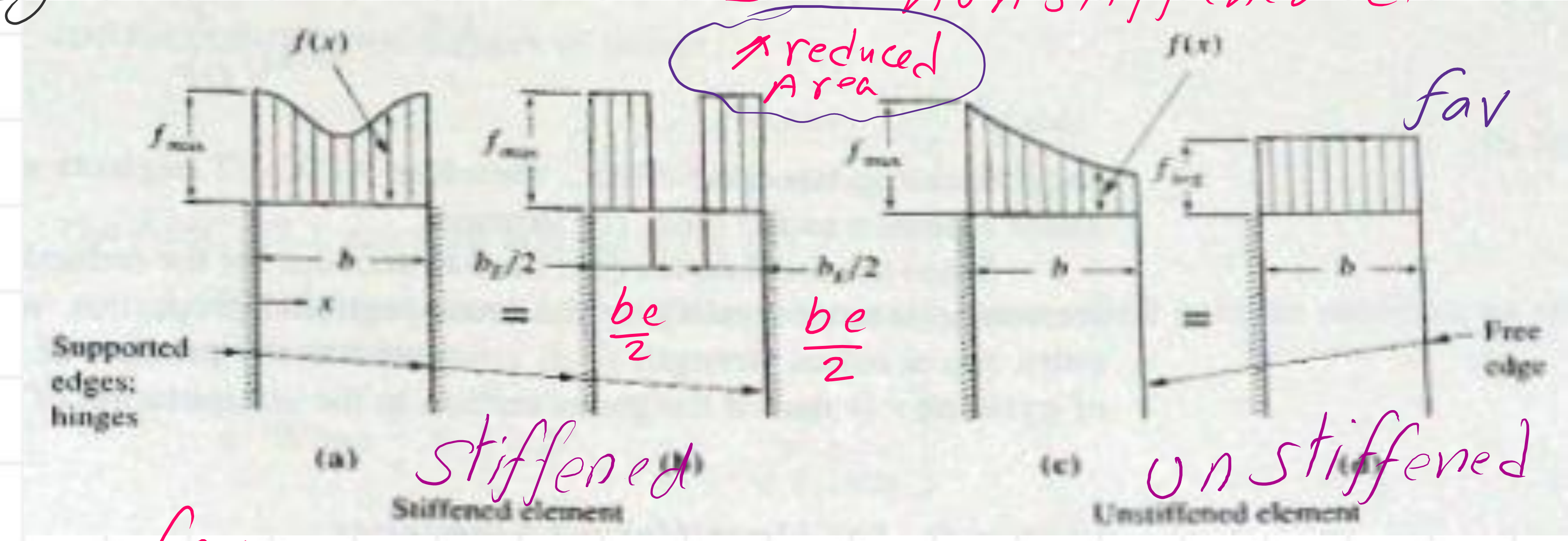
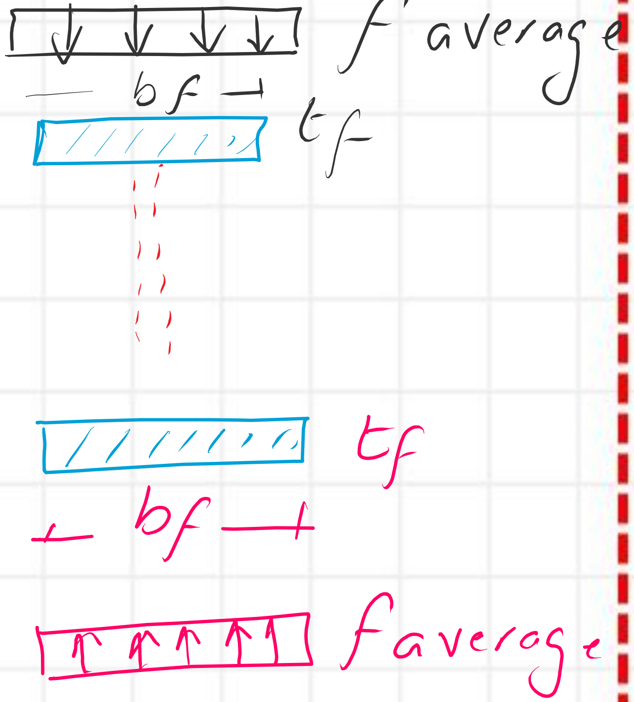
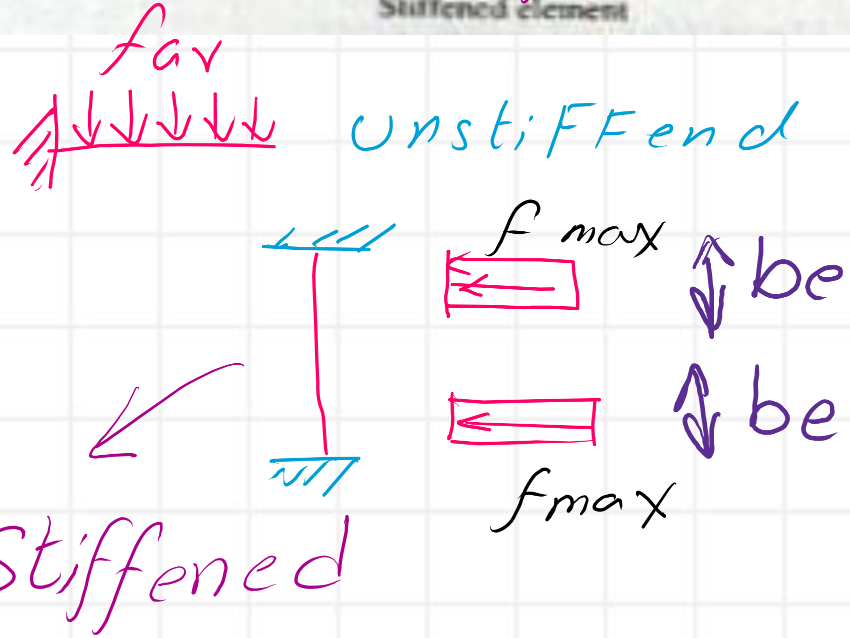
Pg-317

SAlmon → stiffened elements
non stiffened elements

Unstiffend







$P_n = (bt)\, f_{av}$ (bt = A_g)

$P_n = (b_e t)\, f_{max}$

Stress distribution

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QA and Qs

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QA & Qs terms

Compression members composed of both stiffened and unstiffened shall be treated as unstiffened for establishing f_{av} : then the effective width for the stiffened is determined using $f_{av} = f_{max}$

Unstiffened

$$P_n = A_g \cdot f_{av}$$

$$P_n = A_g f_{av} \left(\frac{f_{max}}{f_{max}}\right)$$

$$= f_{max} (Q_s) A_{gross}$$

$$Q_s = f_{av} / f_{max}$$

Stiffened

$$P_n = A_{eff} \cdot f_{max} \left(\frac{A_{gross}}{A_{gross}}\right)$$

$$= \left(\frac{A_{eff}}{A_g}\right) \cdot (f_{max} \cdot A_{gross})$$

$$P_n = Q_A (f_{max})(A_{gross})$$

$$Q_A = \frac{A_{eff}}{A_{gross}}$$

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$$P_n = f_{av} \cdot A_{eff}$$

Whole Section

$$P_n = f_{av} \cdot A_{eff} \left(\frac{f_{max}}{f_{max}}\right)\left(\frac{A_g}{A_g}\right)$$

Qs → QA

A_g: gross area

f_{max}: maximum stress

$$QA = \frac{A_{eff}}{A_g}$$

$$Qs = \frac{f_{av}}{f_{max}}$$

$$P_n = Qs \cdot QA \cdot f_{max} \cdot A_{gross}$$

↓ Gross area

Pn in terms of Qs, QA ,Fmax and Ag

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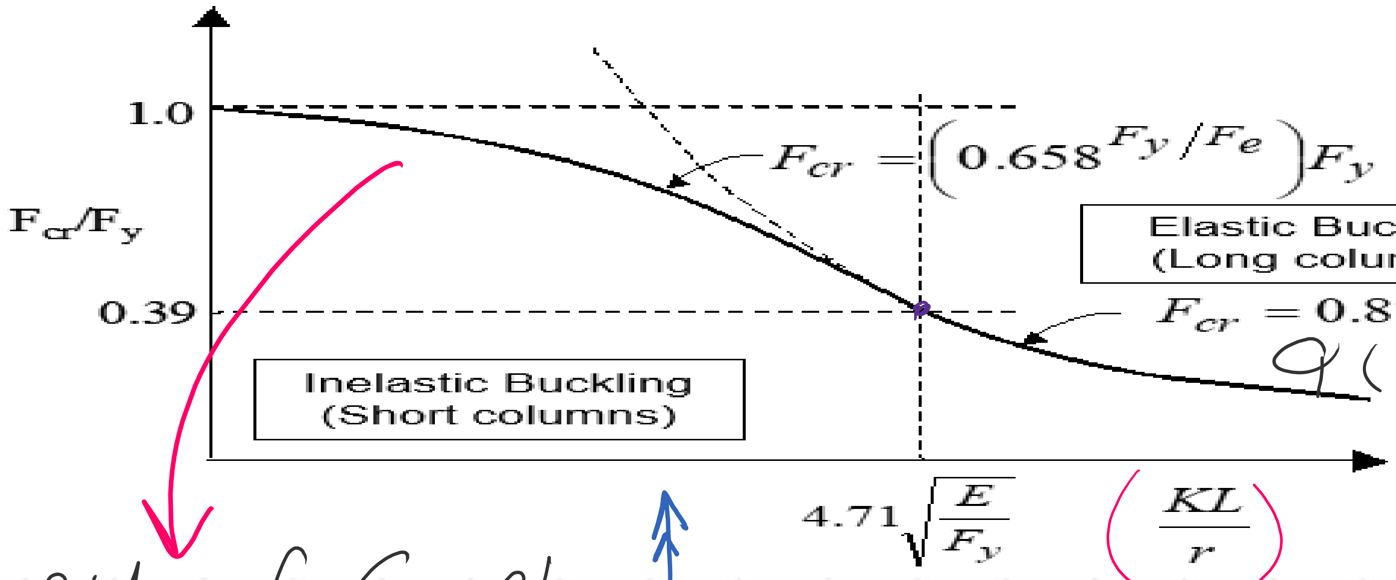
CM # 14

Spec. 2010



$Q(0.877)\,fe$

right side by Q

Left side of Graph

$F_{cr} = Q_s Q_a \left(0.658^{\frac{QF_y}{F_e}}\right) F_y$

$F_{cr} = Q_s Q_a \left(0.658^{\frac{QF_y}{F_e}}\right)(F_y)$

For parameters of stiffened and unstiffened

$Q_s \cdot Q_a = Q$

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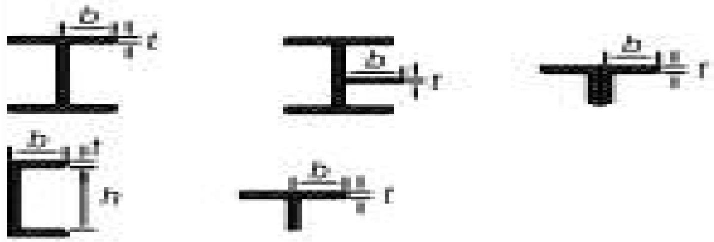
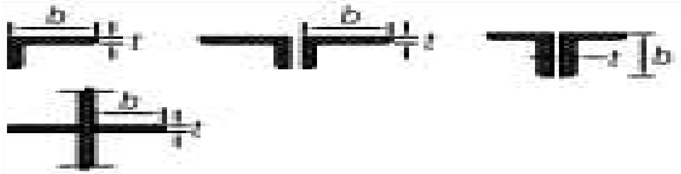
Q, QA and Qs

Lambda r for Un stiffened elements from B4.1a- chapter B

16.1-16 AISC-360-10 λ_r Limiting

TABLE B4.1a
Width-to-Thickness Ratios: Compression Elements Members Subject to Axial Compression

Un-stiffened

	Case	Description of Element	Width-to-Thickness Ratio	Limiting Width-to-Thickness Ratio λ_r (nonslender/slender)	Examples
Unstiffened Elements	1	Flanges of rolled I-shaped sections, plates projecting from rolled I-shaped sections; outstanding legs of pairs of angles connected with continuous contact, flanges of channels, and flanges of tees	b/t	$0.56\sqrt{\frac{E}{F_y}}$	
	2	Flanges of built-up I-shaped sections and plates or angle legs projecting from built-up I-shaped sections	b/t	$0.64\sqrt{\frac{k_c E}{F_y}}$ [a]	
	3	Legs of single angles, legs of double angles with separators, and all other unstiffened elements	b/t	$0.45\sqrt{\frac{E}{F_y}}$	
	4	Stems of tees	d/t	$0.75\sqrt{\frac{E}{F_y}}$	

Stiffened Elements From 5 → 9

stiffened part

Cases from Table B 4.1b part-2

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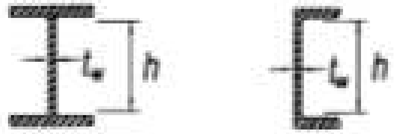
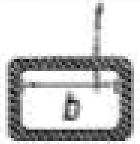
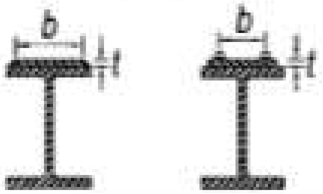
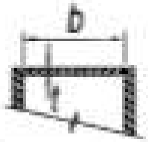
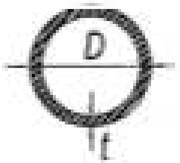
Stiffened Elements	5	Webs of doubly-symmetric I-shaped sections and channels	h/t_w	$1.49\sqrt{\frac{E}{F_y}}$	
	6	Walls of rectangular HSS and boxes of uniform thickness	b/t	$1.40\sqrt{\frac{E}{F_y}}$	
	7	Flange cover plates and diaphragm plates between lines of fasteners or welds	b/t	$1.40\sqrt{\frac{E}{F_y}}$	
	8	All other stiffened elements	b/t	$1.49\sqrt{\frac{E}{F_y}}$	
	9	Round HSS	D/t	$0.11\frac{E}{F_y}$	

↓ Flexure

Lambda r for stiffened elements

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