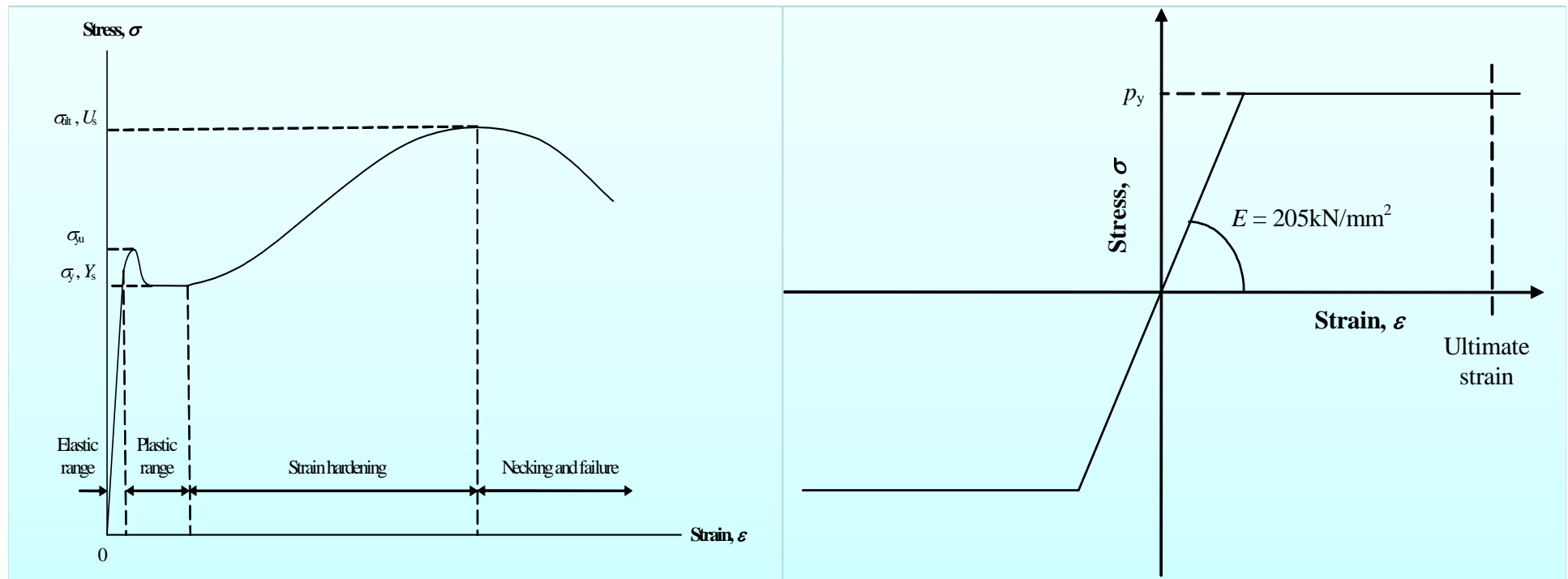


Material properties

- 3 nominal grades of steel (EN 10 025):
 - Fe 360 nominal strength = 235 N/mm²
 - Fe 430 nominal strength = 275 N/mm²
 - Fe 510 nominal strength = 355 N/mm²
- Strengths reduce for $t > 40\text{mm}$ and 100mm
- For all steels $E = 210 \text{ kN/mm}^2$

Properties of Steel

Yield Strength f_y



Typical stress-strain curve for structural mild steel obtained from a tensile test

Idealized stress-strain curve of BS 5950

Eurocode 3

3. Materials – yield strength- hot rolled

Table 3.1: Nominal values of yield strength f_y and ultimate tensile strength f_u for hot rolled structural steel

Standard and steel grade	Nominal thickness of the element t [mm]			
	$t \leq 40$ mm		$40 \text{ mm} < t \leq 80$ mm	
	f_y [N/mm ²]	f_u [N/mm ²]	f_y [N/mm ²]	f_u [N/mm ²]
EN 10025-2				
S 235	235	360	215	360
S 275	275	430	255	410
S 355	355	510	335	470
S 450	440	550	410	550
EN 10025-3				
S 275 N/NL	275	390	255	370
S 355 N/NL	355	490	335	470
S 420 N/NL	420	520	390	520
S 460 N/NL	460	540	430	540
EN 10025-4				
S 275 M/ML	275	370	255	360
S 355 M/ML	355	470	335	450
S 420 M/ML	420	520	390	500
S 460 M/ML	460	540	430	530
EN 10025-5				
S 235 W	235	360	215	340
S 355 W	355	510	335	490
EN 10025-6				
S 460 Q/QL/QL1	460	570	440	550



Eurocode 3

3. Materials – Yield strength

Steel grade	EN 1993-1-1	
	Thickness range (mm)	Yield strength, f_y
S235	$t \leq 40$	235
	$40 < t \leq 80$	215
S275	$t \leq 40$	275
	$40 < t \leq 80$	255
S355	$t \leq 40$	355
	$40 < t \leq 80$	335

For more detail of material properties, refer to Table 3.1



Eurocode 3

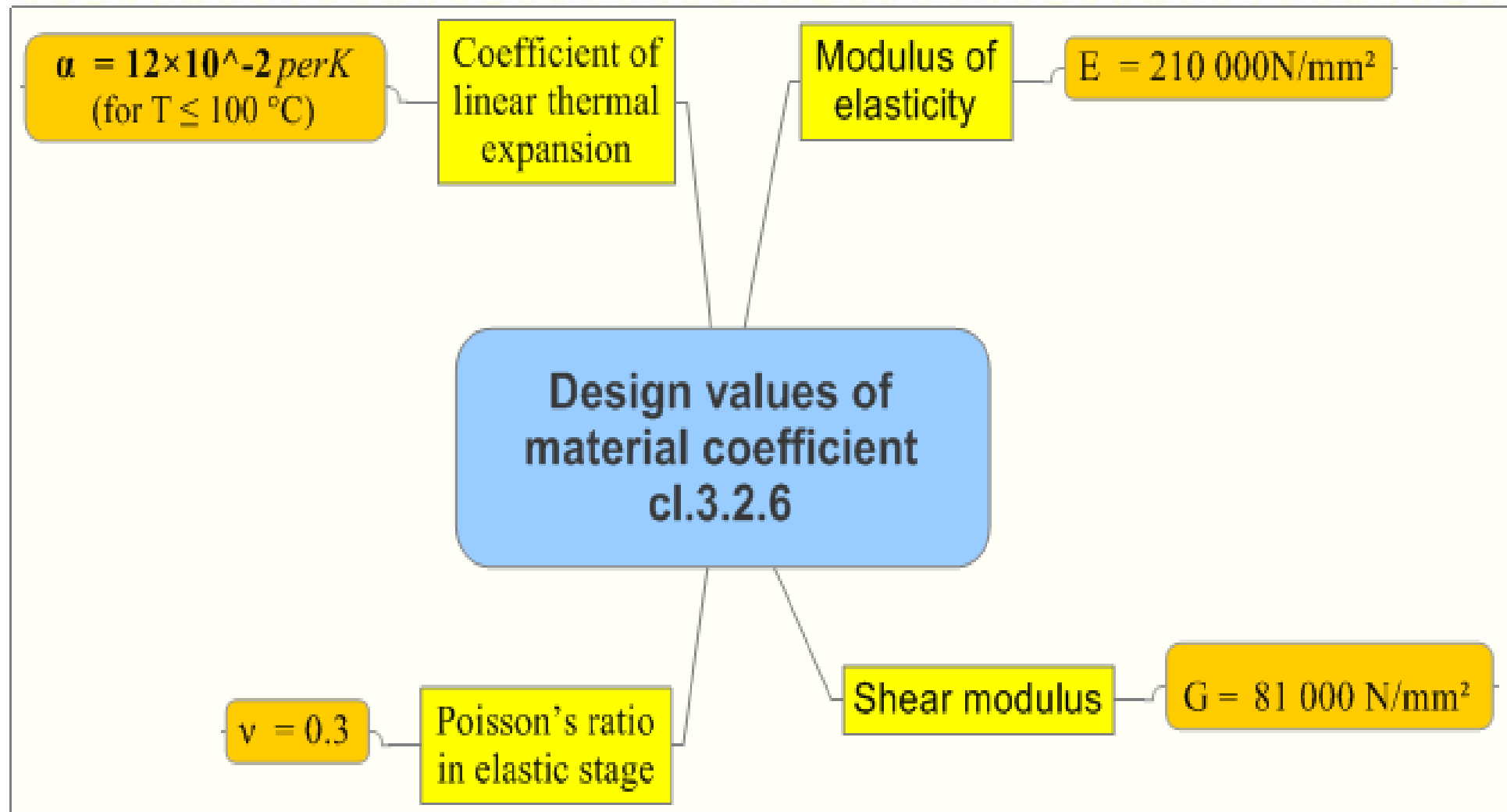
Table 3.1 (continued): Nominal values of yield strength f_y and ultimate tensile strength f_u for structural hollow sections

Standard and steel grade	Nominal thickness of the element t [mm]			
	$t \leq 40$ mm		$40 \text{ mm} < t \leq 80$ mm	
	f_y [N/mm ²]	f_u [N/mm ²]	f_y [N/mm ²]	f_u [N/mm ²]
EN 10210-1				
S 235 H	235	360	215	340
S 275 H	275	430	255	410
S 355 H	355	510	335	490
S 275 NH/NLH	275	390	255	370
S 355 NH/NLH	355	490	335	470
S 420 NH/NHL	420	540	390	520
S 460 NH/NLH	460	560	430	550
EN 10219-1				
S 235 H	235	360		
S 275 H	275	430		
S 355 H	355	510		
S 275 NH/NLH	275	370		
S 355 NH/NLH	355	470		
S 460 NH/NLH	460	550		
S 275 MH/MLH	275	360		
S 355 MH/MLH	355	470		
S 420 MH/MLH	420	500		
S 460 MH/MLH	460	530		

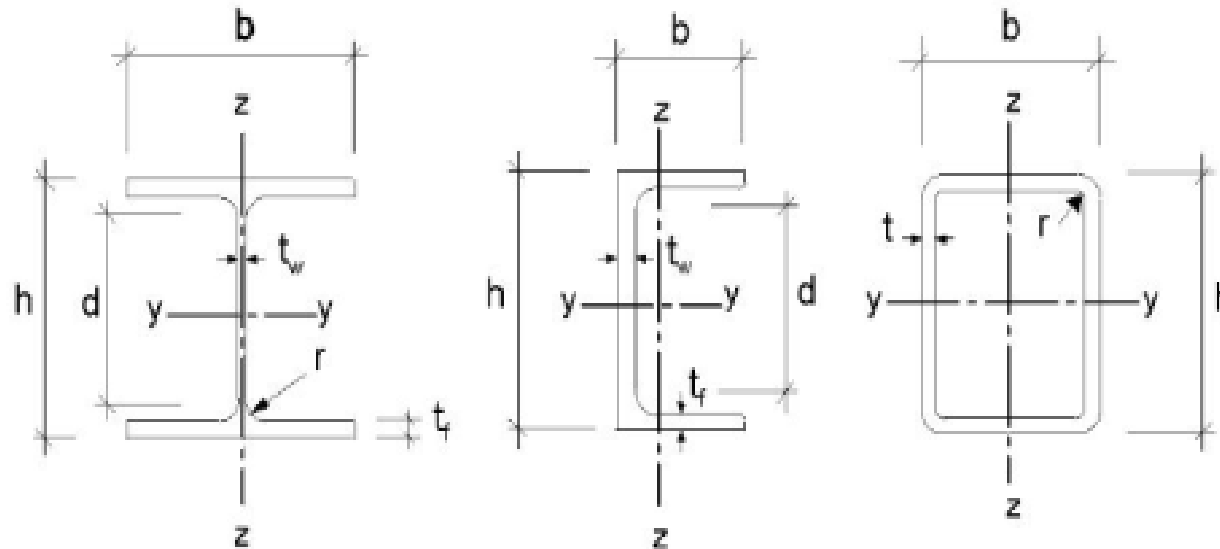
3. Materials -
yield strength-
SHS

3.2 Structural steel - material properties

- modulus of elasticity $E = 210\,000 \text{ N/mm}^2$
- shear modulus $G = \frac{E}{2(1+\nu)} \approx 81\,000 \text{ N/mm}^2$
- Poisson's ratio in elastic stage $\nu = 0,3$
- coefficient of linear thermal expansion $\alpha = 12 \times 10^{-6} \text{ perK}$ (for $T \leq 100 \text{ }^\circ\text{C}$)



Section Properties



	EC	BS 5950
Major axis	y-y	x-x
Minor axis	z-z	y-y
Along the member	x-x	-
Elastic modulus	W_{el}	Z
Plastic modulus	W_{pl}	S
Yield strength	f_y	P_y
	3,456	3.456

Thank You