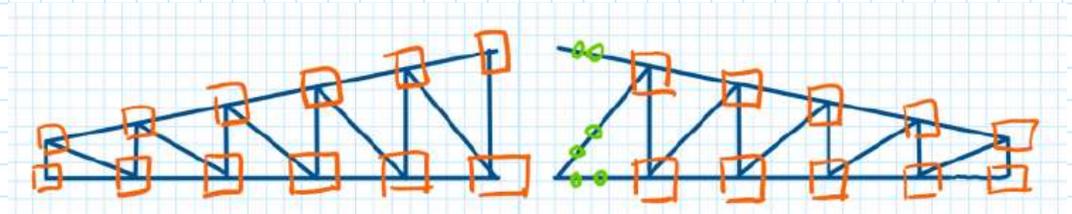


Corrente superiore 1 UPN 50x38

Corrente inferiore 2L 55x5

Diagonali e montanti 2L 50x30x5

Progetto dei collegamenti



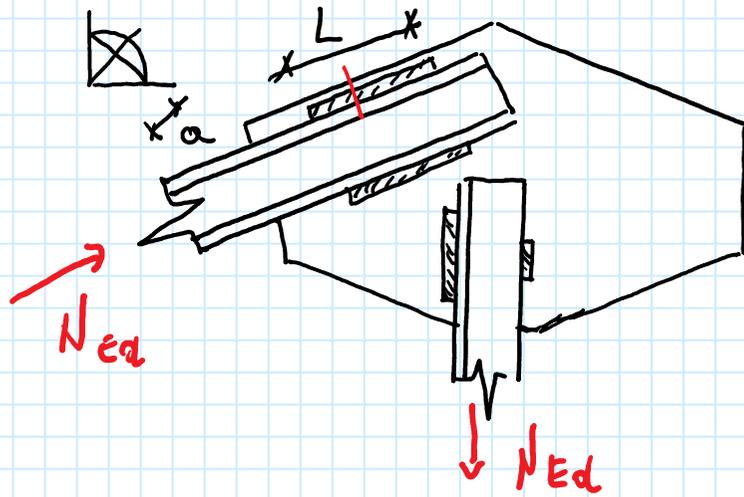
Sforzo normale del corrente inferiore					
Asta	1° comb.	2° comb.	3° comb.	Max traz.	Max Comp.
1	0.00	5.50	0.00	5.50	0.00
2	104.79	69.99	-69.55	104.79	-69.55
3	135.49	81.69	-89.29	135.49	-89.29
4	139.73	74.55	-91.24	139.73	-91.24
5	131.51	58.53	-84.82	131.51	-84.82
6	131.51	33.88	-84.82	131.51	-84.82
7	139.73	29.47	-91.24	139.73	-91.24
8	135.49	23.82	-89.29	135.49	-89.29
9	104.79	15.57	-69.55	104.79	-69.55
10	0.00	0.00	0.00	0.00	0.00

Sforzo normale dei diagonali					
Asta	1° comb.	2° comb.	3° comb.	Max traz.	Max Comp.
21	110.46	67.98	-73.32	110.46	-73.32
22	34.79	13.26	-22.37	34.79	-22.37
23	5.25	-8.87	-2.42	5.25	-8.87
24	-11.24	-21.91	8.78	8.78	-21.91
25	-22.78	-31.59	16.67	16.67	-31.59
26	-22.78	5.66	16.67	16.67	-22.78
27	-11.24	6.04	8.78	8.78	-11.24
28	5.25	7.00	-2.42	7.00	-2.42
29	34.79	9.36	-22.37	34.79	-22.37
30	110.46	16.41	-73.32	110.46	-73.32

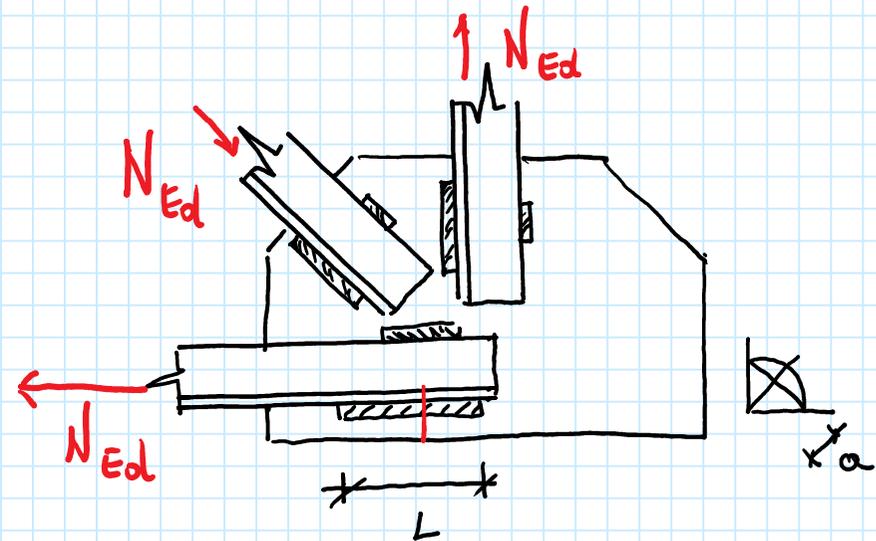
Sforzo normale del corrente superiore					
Asta	1° comb.	2° comb.	3° comb.	Max traz.	Max Comp.
11	-106.87	-65.88	72.00	72.00	-106.87
12	-138.17	-78.04	94.26	94.26	-138.17
13	-142.49	-70.97	98.38	98.38	-142.49
14	-134.11	-54.86	93.97	93.97	-134.11
15	-118.74	-33.77	84.85	84.85	-118.74
16	-118.74	-34.33	84.85	84.85	-118.74
17	-134.11	-31.41	93.97	93.97	-134.11
18	-142.49	-27.81	98.38	98.38	-142.49
19	-138.17	-22.95	94.26	94.26	-138.17
20	-106.87	-15.43	72.00	72.00	-106.87

Sforzo normale dei montanti					
Asta	1° comb.	2° comb.	3° comb.	Max traz.	Max Comp.
31	-62.10	-40.86	41.46	41.46	-62.10
32	-34.93	-21.50	23.18	23.18	-34.93
33	-16.37	-6.24	10.53	10.53	-16.37
34	-3.11	5.24	1.43	5.24	-3.11
35	7.67	14.95	-5.99	14.95	-5.99
36	34.16	19.45	-24.99	34.16	-24.99
37	7.67	-4.12	-5.99	7.67	-5.99
38	-3.11	-4.14	1.43	1.43	-4.14
39	-16.37	-4.40	10.53	10.53	-16.37
40	-34.93	-5.19	23.18	23.18	-34.93
41	-62.10	-7.86	41.46	41.46	-62.10

Nodo sul corrente superiore



Nodo sul corrente inferiore



Progetto dei collegamenti: saldati

Per ogni corrente bisogna dimensionare a ed L

1. Fissiamo " a " e priori

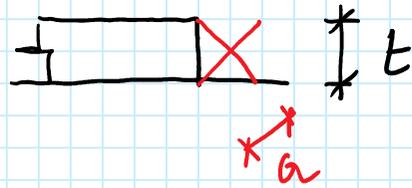
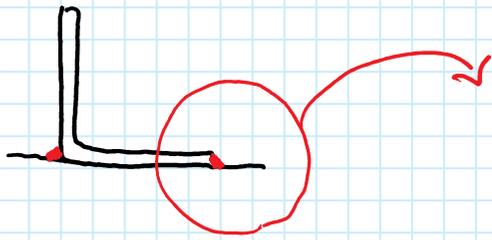
a) unico valore di " a " per tutti i correnti d'angolo

b) oppure 2 valori: uno per i collegamenti più sollecitati, l'altro per quelli meno sollecitati

2. Determiniamo L imponendo il rispetto delle verifiche allo SLO

d'altura delle sezioni di gola "a" deve rispettare limiti di normative e condizioni tecnologiche

$$a \geq 3 \text{ mm} \quad \text{EC3, parte 1-8}$$



$$a \leq \frac{t}{\sqrt{2}} = \frac{5}{\sqrt{2}} = 3,53 \text{ mm}$$

Uso lordoni con $a = 3 \text{ mm}$

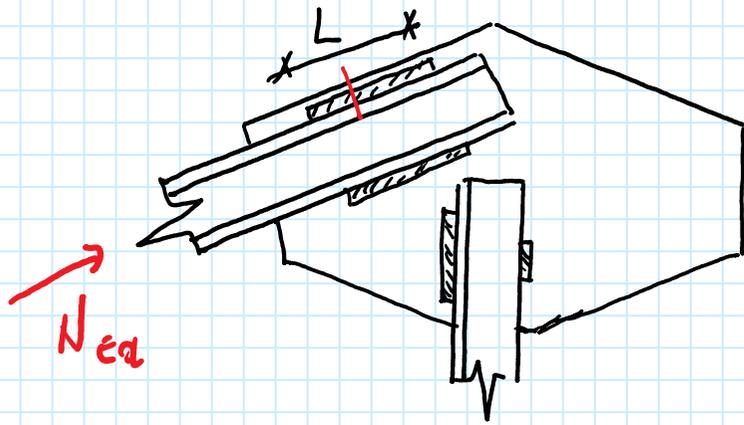
Utilizzo il dominio di resistenza sferico per le verifiche allo SLU dei lordoni

$$t : \frac{F_{w,Ed}}{aL} \leq f_{v,w,pl} \Rightarrow L \geq \frac{F_{w,Ed}}{a f_{v,w,pl}}$$

in ogni caso $L \geq \underline{\underline{6a}} \geq \underline{\underline{30 \text{ mm}}}$

$$(6a = 6 \times 3 = 18 \text{ mm})$$

Corrente superior



$$N_{Ed} = 118,76 \text{ kN}$$

S235

$$a = 3 \text{ mm}$$

Domínio (de existência) Sferico

$$F_{w,Ed} = \frac{N_{Ed}}{4} = \frac{118,76}{4} = 29,7 \text{ kN}$$

de este sono qualifcates com acciaio S235 $\rightarrow f_u = 360 \text{ MPa}$

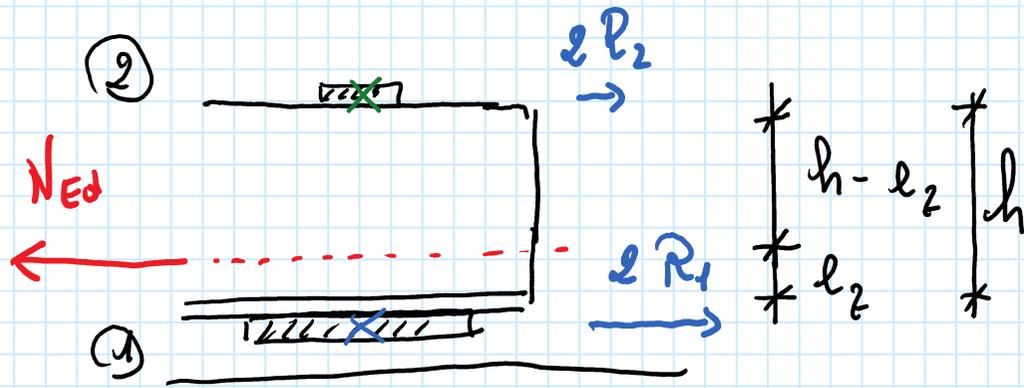
$$\beta_w = 0,80$$

$$f_{v,w,d} = \frac{u}{\sqrt{3} \beta_w \gamma_{M2}} = \frac{360}{\sqrt{3} \times 0,8 \times 1,25} = 207,9 \text{ MPa}$$

$$L = \frac{F_{w,Ed}}{a f_{v,w,d}} = \frac{29,7 \times 10^3}{3 \times 207,9} = \cancel{47,6} \text{ mm}$$

50 mm

Corrente inferiore



$$N_{Ed} = 131,5 \text{ kN}$$

S 235

$$a = 3 \text{ mm}$$

Dominiò (di resistenza) sferice

$$- N_{Ed} (h - e_2) + e R_1 h = 0 \Rightarrow R_1 = \frac{h - e_2}{e h} N_{Ed}$$

$$N_{Ed} e_2 - e R_2 h = 0 \Rightarrow R_2 = \frac{e_2}{e h} N_{Ed}$$

Le forze sui due cordoni sono diverse e dunque le lunghezze sarebbero diverse. Per ogni cordone

$$F_{w,Ed} = R_i \Rightarrow L_i = \frac{R_i}{a f_{w,d}}$$

2L 55x5

$$l_2 = 1,52 \text{ cm} = 15,2 \text{ mm}$$

$$R_1 = \frac{N_{Ed}}{2} \frac{h - l_2}{h} = \frac{131,51}{2} \times \frac{55 - 15,2}{55} = 47,6 \text{ KN}$$

$$L_1 = \frac{R_1}{\alpha f_{v,w,d}} = \frac{47,6 \times 10^3}{3 \times 207,9} = \frac{47,6 \times 10^3}{623,7} = 76,3 \text{ mm}$$

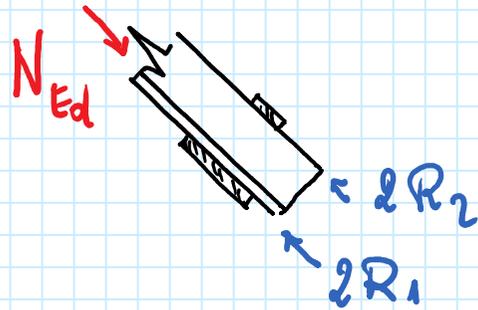
80 mm

$$R_2 = \frac{N_{Ed}}{2} \frac{l_2}{h} = \frac{131,51}{2} \frac{15,2}{55} = 18,2 \text{ KN}$$

$$L_2 = \frac{R_2}{\alpha f_{v,w,d}} = \frac{18,2}{3 \times 207,9} \times 10^3 = \frac{18,2 \times 10^3}{623,7} = 29,2 \text{ mm}$$

30 mm

Diagonale



$$N_{Ed} = 34,16 \text{ kN}$$

S 235

$$a = 3 \text{ mm}$$

Dominiò (di resistenza) sferico

$$2L \ 50 \times 30 \times 5 \quad e_2 = 14,3 \text{ cm} = 14,3 \text{ mm}$$

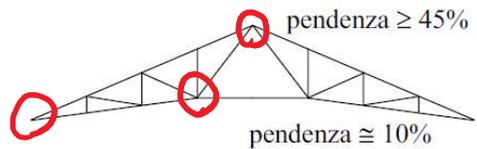
$$R_1 = \frac{(h - e_2)}{2h} N_{Ed} = \frac{50 - 14,3}{2 \times 50} \times 34,16 = 11,2 \text{ kN}$$

$$R_2 = \frac{e_2}{2h} N_{Ed} = \frac{14,3}{2 \times 50} \times 34,16 = 5,9 \text{ kN}$$

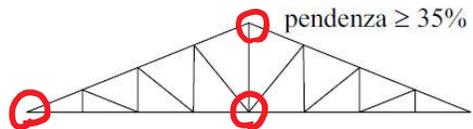
$$L_1 = \frac{11,2 \times 10^3}{3 \times 204,8} = 18,0 \text{ mm} \quad 18,0 \times \frac{30}{9,5} = \frac{56,8}{55} \text{ mm}$$

$$L_2 = \frac{5,9 \times 10^3}{3 \times 204,8} = \frac{9,5}{30} \text{ mm}$$

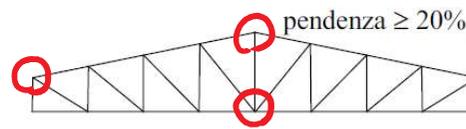
Possibili travature reticolari



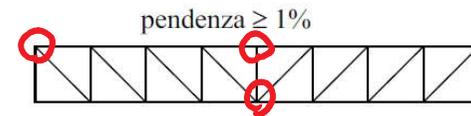
tipologia 1



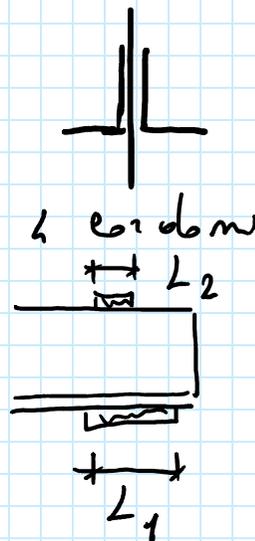
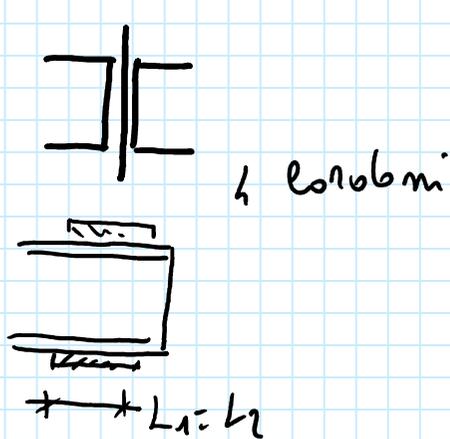
tipologia 2



tipologia 3

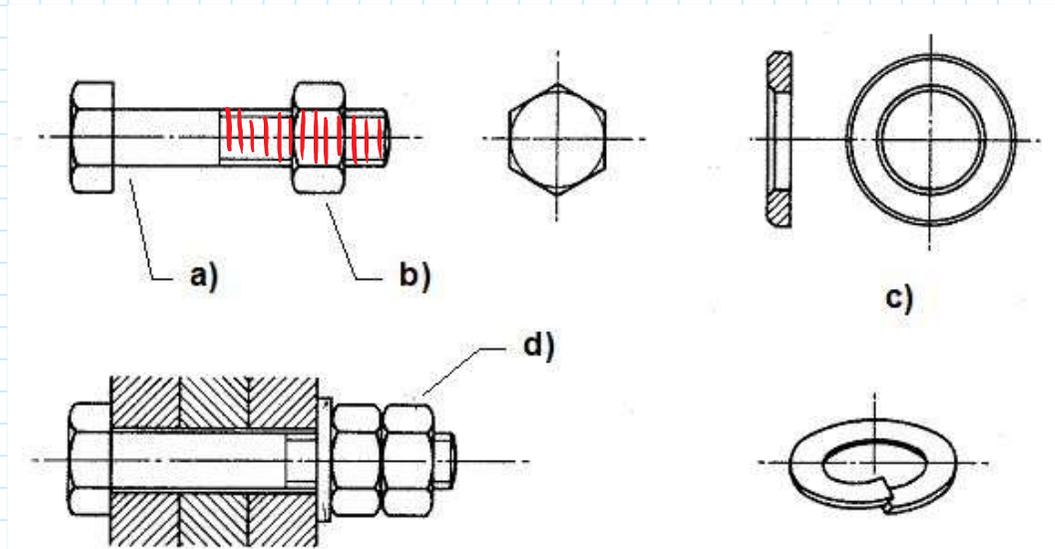


tipologia 4



Collegamenti bullonati

Bulloni



Diámetro (mm)

d 12 14 16 18 20 22 24 27 30

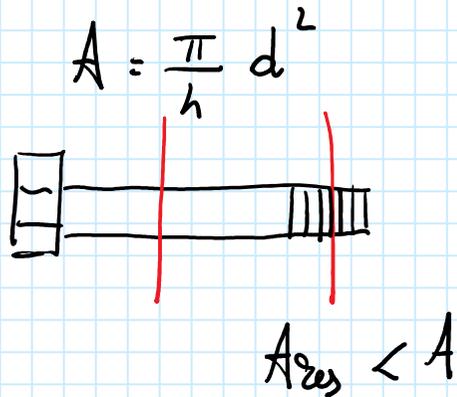
M12 M14 M16 M18 M20 M22 M24 M27 M30

lunghezza delle parti filettate

- gambo interamente filettato
- estremità filettate

Sul gambo del bullone misureremo:

1. "Aree nominali" A sulla parte non filettata
2. "Aree resistenti" A_{res} sulle parti filettate



sigla	M12	M14	M16	M18	M20	M22	M24	M27	M30
A (mm ²)	113	154	201	254	314	380	452	573	707
A_{res} (mm ²)	84.3	115	157	192	245	303	353	459	581
A_{res} / A	0.75	0.75	0.78	0.75	0.78	0.80	0.78	0.80	0.82

Classi di resistenza

4.6 5.6 6.8 8.8 10.9

$$\frac{f_{ub}}{100}$$

$$\frac{f_{yb}}{f_{ub}} \times 10$$

Le classi di resistenza \bar{e} indicate sulle teste del bullone

