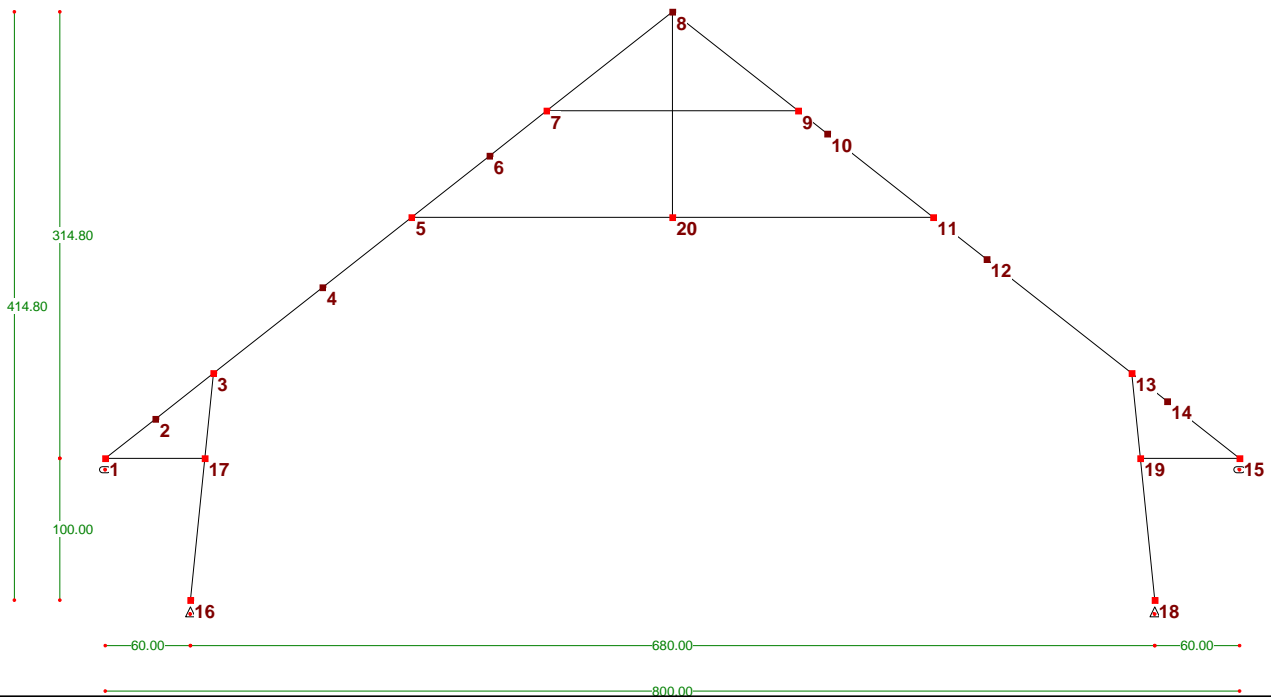


Notes de calcul - Logiciel STRUCTUR - Eurocode 5 - Annexe Française  
 Sans rien

Appuis : - Articulé  $\Delta$  - Rouleau Horiz  $\circ$  - Rouleau Verti  $\ominus$



CARACTÉRISTIQUES MATÉRIAUX

Résineux C18

|   |       |                     |
|---|-------|---------------------|
| Contrainte de Compression Axiale (fc,0,k) :       | 180   | daN/cm <sup>2</sup> |
| Contrainte de Traction Axiale (ft,0,k) :          | 110   | daN/cm <sup>2</sup> |
| Contrainte de Flexion (fm,k) :                    | 180   | daN/cm <sup>2</sup> |
| Contrainte de Cisaillement (fv,k) :               | 34    | daN/cm <sup>2</sup> |
| Cte de Compression Transversale (fc,90,k) :       | 22    | daN/cm <sup>2</sup> |
| Contrainte de Traction Transversale (ft,90,k) :   | 4     | daN/cm <sup>2</sup> |
| Module moyen d'Elasticité Axial (E0,mean) :       | 90000 | daN/cm <sup>2</sup> |
| Module d'Elasticité au fractile 5% (E0,05) :      | 60000 | daN/cm <sup>2</sup> |
| Module moy. d'Elasticité Transversal (E90,mean) : | 3000  | daN/cm <sup>2</sup> |
| Module moyen de Cisaillement (Gmean) :            | 5600  | daN/cm <sup>2</sup> |
| Densité Matière (Masse moyenne) :                 | 380   | kg/m <sup>3</sup>   |
| Elancement maximum :                              | 180   |                     |
| Réduction section au Feu par minute :             | 0.80  | mm                  |
| Volume :  | 0.352 | m <sup>3</sup>      |
| Poids :   | 134   | kg                  |

Bande de chargement : 800.00 cm  
 Classe de service du bâtiment : 1

DÉFINITION DES NOEUDS

| Noeuds | Coord X(cm) | Coord Y(cm) | Appui         |
|--------|-------------|-------------|---------------|
| 1      | 0.00        | 100.00      | Rouleau Horiz |
| 2      | 35.36       | 127.83      |               |
| 3      | 76.24       | 160.00      |               |
| 4      | 153.24      | 220.60      |               |
| 5      | 216.01      | 270.00      |               |
| 6      | 271.11      | 313.36      |               |
| 7      | 311.31      | 345.00      |               |
| 8      | 400.00      | 414.80      |               |
| 9      | 488.69      | 345.00      |               |
| 10     | 509.23      | 328.84      |               |
| 11     | 583.99      | 270.00      |               |
| 12     | 621.60      | 240.40      |               |
| 13     | 723.76      | 160.00      |               |
| 14     | 748.91      | 140.21      |               |
| 15     | 800.00      | 100.00      | Rouleau Horiz |
| 16     | 60.00       | 0.00        | Articulé      |
| 17     | 70.15       | 100.00      |               |
| 18     | 740.00      | 0.00        | Articulé      |
| 19     | 729.85      | 100.00      |               |
| 20     | 400.00      | 270.00      |               |

DÉFINITION DES BARRES

Unités : Longueurs (cm)

| Barres      | Relaxation | Epaisseur | Retombées |       | Entraxe | Longueurs |          |          |
|-------------|------------|-----------|-----------|-------|---------|-----------|----------|----------|
|             |            |           | Début     | Fin   |         | Réelle    | Fib Perp | Fib Plan |
| Arbalétrier |            |           |           |       |         |           |          |          |
| 1/2         | Art / Enc  | 7.00      | 20.00     |       | 800.00  | 45.00     | 509.02   | 97.02    |
| 2/3         | Enc / Enc  | 7.00      | 20.00     |       | 800.00  | 52.02     | 509.02   | 97.02    |
| 3/4         | Enc / Enc  | 7.00      | 20.00     |       | 800.00  | 97.98     | 509.02   | 177.87   |
| 4/5         | Enc / Enc  | 7.00      | 20.00     |       | 800.00  | 79.88     | 509.02   | 177.87   |
| 5/6         | Enc / Enc  | 7.00      | 20.00     |       | 800.00  | 70.12     | 509.02   | 121.27   |
| 6/7         | Enc / Enc  | 7.00      | 20.00     |       | 800.00  | 51.15     | 509.02   | 121.27   |
| 7/8         | Enc / Art  | 7.00      | 20.00     |       | 800.00  | 112.86    | 509.02   | 112.86   |
| 8/9         | Art / Enc  | 7.00      |           | 20.00 | 800.00  | 112.86    | 509.02   | 112.86   |
| 9/10        | Enc / Enc  | 7.00      | 20.00     |       | 800.00  | 26.14     | 509.02   | 121.27   |
| 10/11       | Enc / Enc  | 7.00      | 20.00     |       | 800.00  | 95.14     | 509.02   | 121.27   |
| 11/12       | Enc / Enc  | 7.00      | 20.00     |       | 800.00  | 47.86     | 509.02   | 177.87   |

|                |           |       |       |        |        |        |        |
|----------------|-----------|-------|-------|--------|--------|--------|--------|
| Arbalétrier    |           |       |       |        |        |        |        |
| 12/13          | Enc / Enc | 7.00  | 20.00 | 800.00 | 130.00 | 509.02 | 177.87 |
| 13/14          | Enc / Enc | 7.00  | 20.00 | 800.00 | 32.00  | 509.02 | 97.02  |
| 14/15          | Enc / Art | 7.00  | 20.00 | 800.00 | 65.02  | 509.02 | 97.02  |
| Entrait        |           |       |       |        |        |        |        |
| 5/20           | Art / Enc | 12.00 | 17.50 | 800.00 | 183.99 | 367.98 | 183.99 |
| 20/11          | Enc / Art | 12.00 | 17.50 | 800.00 | 183.99 | 367.98 | 183.99 |
| 7/9            | Art / Art | 12.00 | 17.50 | 800.00 | 177.38 | 177.38 | 177.38 |
| Poinçon        |           |       |       |        |        |        |        |
| 20/8           | Art / Art | 7.00  | 20.00 | 800.00 | 144.80 | 144.80 | 144.80 |
| Blochets       |           |       |       |        |        |        |        |
| 1/17           | Art / Art | 12.00 | 17.50 | 800.00 | 70.15  | 70.15  | 70.15  |
| 19/15          | Art / Art | 12.00 | 17.50 | 800.00 | 70.15  | 70.15  | 70.15  |
| Jambe de force |           |       |       |        |        |        |        |
| 16/17          | Art / Enc | 7.00  | 20.00 | 800.00 | 100.51 | 160.82 | 100.51 |
| 17/3           | Enc / Art | 7.00  | 20.00 | 800.00 | 60.31  | 160.82 | 60.31  |
| 13/19          | Art / Enc | 7.00  | 20.00 | 800.00 | 60.31  | 160.82 | 60.31  |
| 19/18          | Enc / Art | 7.00  | 20.00 | 800.00 | 100.51 | 160.82 | 100.51 |

### CHARGES NODALES

Unités : daN

| Noeud | Perma Vrt | Neige   |         | Neige Redistribuée |           |         |           |
|-------|-----------|---------|---------|--------------------|-----------|---------|-----------|
|       |           | Norm    | Exc.    | Cas 1              |           | Cas 2   |           |
| 2     | -150.00   | -118.00 | -118.00 | -59.00             | (-59.00)  | -118.00 | (-118.00) |
| 4     | -219.00   | -181.00 | -181.00 | -90.50             | (-90.50)  | -181.00 | (-181.00) |
| 6     | -214.00   | -177.00 | -177.00 | -88.50             | (-88.50)  | -177.00 | (-177.00) |
| 8     | -207.00   | -170.00 | -170.00 | -127.50            | (-127.50) | -127.50 | (-127.50) |
| 10    | -207.00   | -170.00 | -170.00 | -170.00            | (-170.00) | -85.00  | (-85.00)  |
| 12    | -222.00   | -185.00 | -185.00 | -185.00            | (-185.00) | -92.50  | (-92.50)  |
| 14    | -168.00   | -134.00 | -134.00 | -134.00            | (-134.00) | -67.00  | (-67.00)  |

### CHARGES UNIFORMÉMENT REPARTIES

Unités : Charges Saisies (daN/m²)

| Barres         | Permanente | Neige  |        | Neige Redistribuée |         |        |        |         |      |
|----------------|------------|--------|--------|--------------------|---------|--------|--------|---------|------|
|                |            | Norm   | Exc.   | Norm               | Neige 1 | Exc.   | Norm   | Neige 2 | Exc. |
| Arbalétrier    |            |        |        |                    |         |        |        |         |      |
| 1/2            | 0.00       | -35.00 | -60.00 | -17.50             | -30.00  | -35.00 | -60.00 |         |      |
| 2/3            | 0.00       | -35.00 | -60.00 | -17.50             | -30.00  | -35.00 | -60.00 |         |      |
| 3/4            | 0.00       | -35.00 | -60.00 | -17.50             | -30.00  | -35.00 | -60.00 |         |      |
| 4/5            | 0.00       | -35.00 | -60.00 | -17.50             | -30.00  | -35.00 | -60.00 |         |      |
| 5/6            | 0.00       | -35.00 | -60.00 | -17.50             | -30.00  | -35.00 | -60.00 |         |      |
| 6/7            | 0.00       | -35.00 | -60.00 | -17.50             | -30.00  | -35.00 | -60.00 |         |      |
| 7/8            | 0.00       | -35.00 | -60.00 | -17.50             | -30.00  | -35.00 | -60.00 |         |      |
| 8/9            | 0.00       | -35.00 | -60.00 | -35.00             | -60.00  | -17.50 | -30.00 |         |      |
| 9/10           | 0.00       | -35.00 | -60.00 | -35.00             | -60.00  | -17.50 | -30.00 |         |      |
| 10/11          | 0.00       | -35.00 | -60.00 | -35.00             | -60.00  | -17.50 | -30.00 |         |      |
| 11/12          | 0.00       | -35.00 | -60.00 | -35.00             | -60.00  | -17.50 | -30.00 |         |      |
| 12/13          | 0.00       | -35.00 | -60.00 | -35.00             | -60.00  | -17.50 | -30.00 |         |      |
| 13/14          | 0.00       | -35.00 | -60.00 | -35.00             | -60.00  | -17.50 | -30.00 |         |      |
| 14/15          | 0.00       | -35.00 | -60.00 | -35.00             | -60.00  | -17.50 | -30.00 |         |      |
| Entrait        |            |        |        |                    |         |        |        |         |      |
| 5/20           | 0.00       | 0.00   | 0.00   | 0.00               | 0.00    | 0.00   | 0.00   |         |      |
| 20/11          | 0.00       | 0.00   | 0.00   | 0.00               | 0.00    | 0.00   | 0.00   |         |      |
| 7/9            | 0.00       | 0.00   | 0.00   | 0.00               | 0.00    | 0.00   | 0.00   |         |      |
| Poinçon        |            |        |        |                    |         |        |        |         |      |
| 20/8           | 0.00       | 0.00   | 0.00   | 0.00               | 0.00    | 0.00   | 0.00   |         |      |
| Blochets       |            |        |        |                    |         |        |        |         |      |
| 1/17           | 0.00       | 0.00   | 0.00   | 0.00               | 0.00    | 0.00   | 0.00   |         |      |
| 19/15          | 0.00       | 0.00   | 0.00   | 0.00               | 0.00    | 0.00   | 0.00   |         |      |
| Jambe de force |            |        |        |                    |         |        |        |         |      |
| 16/17          | 0.00       | 0.00   | 0.00   | 0.00               | 0.00    | 0.00   | 0.00   |         |      |
| 17/3           | 0.00       | 0.00   | 0.00   | 0.00               | 0.00    | 0.00   | 0.00   |         |      |
| 13/19          | 0.00       | 0.00   | 0.00   | 0.00               | 0.00    | 0.00   | 0.00   |         |      |
| 19/18          | 0.00       | 0.00   | 0.00   | 0.00               | 0.00    | 0.00   | 0.00   |         |      |

Unités : Charges Résultantes (daN/m)

| Barres         | Permanente | Neige  |        | Neige Redistribuée |         |        |        |         |      |
|----------------|------------|--------|--------|--------------------|---------|--------|--------|---------|------|
|                |            | Norm   | Exc.   | Norm               | Neige 1 | Exc.   | Norm   | Neige 2 | Exc. |
| Arbalétrier    |            |        |        |                    |         |        |        |         |      |
| 1/2            | -5.3       | -220.0 | -377.2 | -110.0             | -188.6  | -220.0 | -377.2 |         |      |
| 2/3            | -5.3       | -220.0 | -377.2 | -110.0             | -188.6  | -220.0 | -377.2 |         |      |
| 3/4            | -5.3       | -220.0 | -377.2 | -110.0             | -188.6  | -220.0 | -377.2 |         |      |
| 4/5            | -5.3       | -220.0 | -377.2 | -110.0             | -188.6  | -220.0 | -377.2 |         |      |
| 5/6            | -5.3       | -220.0 | -377.2 | -110.0             | -188.6  | -220.0 | -377.2 |         |      |
| 6/7            | -5.3       | -220.0 | -377.2 | -110.0             | -188.6  | -220.0 | -377.2 |         |      |
| 7/8            | -5.3       | -220.0 | -377.2 | -110.0             | -188.6  | -220.0 | -377.2 |         |      |
| 8/9            | -5.3       | -220.0 | -377.2 | -220.0             | -377.2  | -110.0 | -188.6 |         |      |
| 9/10           | -5.3       | -220.0 | -377.2 | -220.0             | -377.2  | -110.0 | -188.6 |         |      |
| 10/11          | -5.3       | -220.0 | -377.2 | -220.0             | -377.2  | -110.0 | -188.6 |         |      |
| 11/12          | -5.3       | -220.0 | -377.2 | -220.0             | -377.2  | -110.0 | -188.6 |         |      |
| 12/13          | -5.3       | -220.0 | -377.2 | -220.0             | -377.2  | -110.0 | -188.6 |         |      |
| 13/14          | -5.3       | -220.0 | -377.2 | -220.0             | -377.2  | -110.0 | -188.6 |         |      |
| 14/15          | -5.3       | -220.0 | -377.2 | -220.0             | -377.2  | -110.0 | -188.6 |         |      |
| Entrait        |            |        |        |                    |         |        |        |         |      |
| 5/20           | -8.0       | 0.0    | 0.0    | 0.0                | 0.0     | 0.0    | 0.0    |         |      |
| 20/11          | -8.0       | 0.0    | 0.0    | 0.0                | 0.0     | 0.0    | 0.0    |         |      |
| 7/9            | -8.0       | 0.0    | 0.0    | 0.0                | 0.0     | 0.0    | 0.0    |         |      |
| Poinçon        |            |        |        |                    |         |        |        |         |      |
| 20/8           | -5.3       | 0.0    | 0.0    | 0.0                | 0.0     | 0.0    | 0.0    |         |      |
| Blochets       |            |        |        |                    |         |        |        |         |      |
| 1/17           | -8.0       | 0.0    | 0.0    | 0.0                | 0.0     | 0.0    | 0.0    |         |      |
| 19/15          | -8.0       | 0.0    | 0.0    | 0.0                | 0.0     | 0.0    | 0.0    |         |      |
| Jambe de force |            |        |        |                    |         |        |        |         |      |
| 16/17          | -5.3       | 0.0    | 0.0    | 0.0                | 0.0     | 0.0    | 0.0    |         |      |
| 17/3           | -5.3       | 0.0    | 0.0    | 0.0                | 0.0     | 0.0    | 0.0    |         |      |
| 13/19          | -5.3       | 0.0    | 0.0    | 0.0                | 0.0     | 0.0    | 0.0    |         |      |

Jambe de force  
 19/18 -5.3 0.0 0.0 0.0 0.0 0.0 0.0

FLÈCHES SUR PIÈCES

Unités : Déplacements (cm)

**Cas ELS 1 : Permanente**

| Barres         | Flèche résultante finale |        |     | Kdef |
|----------------|--------------------------|--------|-----|------|
|                | Fleches                  | /long  | Pos |      |
| Arbalétrier    |                          |        |     |      |
| 1/8            | -0.43                    | <1/999 | 58% | 0.60 |
| 8/15           | -0.49                    | <1/999 | 42% | 0.60 |
| Entrait        |                          |        |     |      |
| 5/11           | -0.03                    | <1/999 | 53% | 0.60 |
| 7/9            | 0.00                     | <1/999 | 50% | 0.60 |
| Poinçon        |                          |        |     |      |
| 20/8           | 0.00                     | <1/999 | 6%  | 0.60 |
| Jambe de force |                          |        |     |      |
| 16/3           | 0.20                     | 1/807  | 59% | 0.60 |
| 13/18          | 0.20                     | 1/815  | 41% | 0.60 |
| Blochets       |                          |        |     |      |
| 1/17           | 0.00                     | <1/999 | 50% | 0.60 |
| 19/15          | 0.00                     | <1/999 | 50% | 0.60 |

**Cas ELS 2 : Permanente + Neige**

| Barres         | Flèche résultante finale |        |     | Kdef |
|----------------|--------------------------|--------|-----|------|
|                | Fleches                  | /long  | Pos |      |
| Arbalétrier    |                          |        |     |      |
| 1/8            | -1.04                    | 1/489  | 58% | 0.60 |
| 8/15           | -1.13                    | 1/452  | 42% | 0.60 |
| Entrait        |                          |        |     |      |
| 5/11           | -0.07                    | <1/999 | 53% | 0.60 |
| 7/9            | 0.00                     | <1/999 | 50% | 0.60 |
| Poinçon        |                          |        |     |      |
| 20/8           | 0.00                     | <1/999 | 89% | 0.60 |
| Jambe de force |                          |        |     |      |
| 16/3           | 0.47                     | 1/344  | 59% | 0.60 |
| 13/18          | 0.47                     | 1/346  | 41% | 0.60 |
| Blochets       |                          |        |     |      |
| 1/17           | 0.00                     | <1/999 | 50% | 0.60 |
| 19/15          | 0.00                     | <1/999 | 50% | 0.60 |

**Cas ELS (Neige redistribuée 1) 2 : Permanente + Neige**

| Barres         | Flèche résultante finale |        |     | Kdef |
|----------------|--------------------------|--------|-----|------|
|                | Fleches                  | /long  | Pos |      |
| Arbalétrier    |                          |        |     |      |
| 1/8            | 0.57                     | 1/897  | 18% | 0.60 |
| 8/15           | -1.33                    | 1/382  | 42% | 0.60 |
| Entrait        |                          |        |     |      |
| 5/11           | -0.06                    | <1/999 | 47% | 0.60 |
| 7/9            | 0.00                     | <1/999 | 50% | 0.60 |
| Poinçon        |                          |        |     |      |
| 20/8           | 0.00                     | <1/999 | 28% | 0.60 |
| Jambe de force |                          |        |     |      |
| 16/3           | 0.43                     | 1/372  | 59% | 0.60 |
| 13/18          | 0.37                     | 1/436  | 41% | 0.60 |
| Blochets       |                          |        |     |      |
| 1/17           | 0.00                     | <1/999 | 50% | 0.60 |
| 19/15          | 0.00                     | <1/999 | 50% | 0.60 |

**Cas ELS (Neige redistribuée 2) 2 : Permanente + Neige**

| Barres         | Flèche résultante finale |        |     | Kdef |
|----------------|--------------------------|--------|-----|------|
|                | Fleches                  | /long  | Pos |      |
| Arbalétrier    |                          |        |     |      |
| 1/8            | -1.25                    | 1/407  | 59% | 0.60 |
| 8/15           | -0.60                    | 1/845  | 43% | 0.60 |
| Entrait        |                          |        |     |      |
| 5/11           | -0.06                    | <1/999 | 47% | 0.60 |
| 7/9            | 0.00                     | <1/999 | 50% | 0.60 |
| Poinçon        |                          |        |     |      |
| 20/8           | 0.00                     | <1/999 | 28% | 0.60 |
| Jambe de force |                          |        |     |      |
| 16/3           | 0.37                     | 1/435  | 59% | 0.60 |
| 13/18          | 0.43                     | 1/376  | 41% | 0.60 |
| Blochets       |                          |        |     |      |
| 1/17           | 0.00                     | <1/999 | 50% | 0.60 |
| 19/15          | 0.00                     | <1/999 | 50% | 0.60 |

RÉACTIONS PONDÉRÉES AUX APPUIS

Unités : Efforts (daN) - Moment (daN.cm)

**Cas ELU 1 : 1.35\*Permanente**

| Noeuds | Réactions aux appuis |         |         | Réactions caractéristiques 1 |              |
|--------|----------------------|---------|---------|------------------------------|--------------|
|        | Horiz.               | Vertic. | Moments | Horiz. (Rk)                  | Vertic. (Rk) |
| 1      | 0.0                  | 222.2   | 0       | 0.0                          | 481.5        |
| 15     | 0.0                  | 180.2   | 0       | 0.0                          | 390.5        |
| 16     | 344.9                | 812.3   | 0       | 747.2                        | 1759.9       |
| 18     | -344.9               | 838.2   | 0       | -747.2                       | 1816.1       |

**Cas ELU 2 : 1.35\*Permanente + 1.5\*Neige**

| Noeuds | Réactions aux appuis |         |         | Réactions caractéristiques 1 |              |
|--------|----------------------|---------|---------|------------------------------|--------------|
|        | Horiz.               | Vertic. | Moments | Horiz. (Rk)                  | Vertic. (Rk) |
| 1      | 0.0                  | 728.8   | 0       | 0.0                          | 1052.7       |
| 15     | 0.0                  | 649.2   | 0       | 0.0                          | 937.8        |
| 16     | 1181.5               | 2842.9  | 0       | 1706.6                       | 4106.4       |
| 18     | -1181.5              | 2894.6  | 0       | -1706.6                      | 4181.0       |

**Cas ELU (Neige redistribuée 1) 2 : 1.35\*Permanente + 1.5\*Neige**

| Noeuds | Réactions aux appuis |         |         | Réactions caractéristiques 1 |              |
|--------|----------------------|---------|---------|------------------------------|--------------|
|        | Horiz.               | Vertic. | Moments | Horiz. (Rk)                  | Vertic. (Rk) |
| 1      | 0.0                  | 889.3   | 0       | 0.0                          | 1284.5       |
| 15     | 0.0                  | 243.2   | 0       | 0.0                          | 351.2        |
| 16     | 974.9                | 1633.0  | 0       | 1408.3                       | 2358.8       |
| 18     | -974.9               | 3089.2  | 0       | -1408.3                      | 4462.2       |

**Cas ELU (Neige redistribuée 2) 2 : 1.35\*Permanente + 1.5\*Neige**

| Noeuds | Réactions aux appuis |         |         | Réactions caractéristiques 1 |              |
|--------|----------------------|---------|---------|------------------------------|--------------|
|        | Horiz.               | Vertic. | Moments | Horiz. (Rk)                  | Vertic. (Rk) |
| 1      | 0.0                  | 315.0   | 0       | 0.0                          | 454.9        |
| 15     | 0.0                  | 820.8   | 0       | 0.0                          | 1185.6       |
| 16     | 969.8                | 3037.4  | 0       | 1400.8                       | 4387.4       |
| 18     | -969.8               | 1671.8  | 0       | -1400.8                      | 2414.8       |

**Cas ELU (Neige Exceptionnelle) 2 (Accidentelle) : Permanente + Neige EXC.**

| Noeuds | Réactions aux appuis |         |         | Réactions caractéristiques 1 |              |
|--------|----------------------|---------|---------|------------------------------|--------------|
|        | Horiz.               | Vertic. | Moments | Horiz. (Rk)                  | Vertic. (Rk) |
| 1      | 0.0                  | 656.7   | 0       | 0.0                          | 776.1        |
| 15     | 0.0                  | 600.3   | 0       | 0.0                          | 709.4        |
| 16     | 1073.8               | 2600.9  | 0       | 1269.1                       | 3073.8       |
| 18     | -1073.8              | 2637.8  | 0       | -1269.1                      | 3117.3       |

**Cas ELU (Neige Exceptionnelle redistribuée 1) 2 (Accidentelle) : Permanente + Neige EXC.**

| Noeuds | Réactions aux appuis |         |         | Réactions caractéristiques 1 |              |
|--------|----------------------|---------|---------|------------------------------|--------------|
|        | Horiz.               | Vertic. | Moments | Horiz. (Rk)                  | Vertic. (Rk) |
| 1      | 0.0                  | 815.7   | 0       | 0.0                          | 964.0        |
| 15     | 0.0                  | 200.6   | 0       | 0.0                          | 237.1        |
| 16     | 871.0                | 1408.8  | 0       | 1029.4                       | 1665.0       |
| 18     | -871.0               | 2830.0  | 0       | -1029.4                      | 3344.6       |

**Cas ELU (Neige Exceptionnelle redistribuée 2) 2 (Accidentelle) : Permanente + Neige EXC.**

| Noeuds | Réactions aux appuis |         |         | Réactions caractéristiques 1 |              |
|--------|----------------------|---------|---------|------------------------------|--------------|
|        | Horiz.               | Vertic. | Moments | Horiz. (Rk)                  | Vertic. (Rk) |
| 1      | 0.0                  | 251.7   | 0       | 0.0                          | 297.5        |
| 15     | 0.0                  | 766.5   | 0       | 0.0                          | 905.9        |
| 16     | 867.5                | 2793.4  | 0       | 1025.2                       | 3301.3       |
| 18     | -867.5               | 1437.0  | 0       | -1025.2                      | 1698.3       |

**RÉACTIONS NON PONDÉRÉES AUX APPUIS \***

Unités : Efforts (daN) - Moment (daN.cm)

**RÉACTIONS : VERTICALES par type de charge**

| Noeuds | Permanentes | Neige  | Neige Exc. | Vent A | Vent B | Vent C | Vent D | Expl. Plancher | Expl. Toiture |
|--------|-------------|--------|------------|--------|--------|--------|--------|----------------|---------------|
| 1      | 164.6       | 337.7  | 492.1      | 0.0    | 0.0    | 0.0    | 0.0    | 0.0            | 0.0           |
| 15     | 133.5       | 312.7  | 466.7      | 0.0    | 0.0    | 0.0    | 0.0    | 0.0            | 0.0           |
| 16     | 601.7       | 1353.7 | 1999.3     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0            | 0.0           |
| 18     | 620.9       | 1370.9 | 2016.8     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0            | 0.0           |

**RÉACTIONS : HORIZONTALES par type de charge**

| Noeuds | Permanentes | Neige  | Neige Exc. | Vent A | Vent B | Vent C | Vent D | Expl. Plancher | Expl. Toiture |
|--------|-------------|--------|------------|--------|--------|--------|--------|----------------|---------------|
| 1      | 0.0         | 0.0    | 0.0        | 0.0    | 0.0    | 0.0    | 0.0    | 0.0            | 0.0           |
| 15     | 0.0         | 0.0    | 0.0        | 0.0    | 0.0    | 0.0    | 0.0    | 0.0            | 0.0           |
| 16     | 255.5       | 557.8  | 818.4      | 0.0    | 0.0    | 0.0    | 0.0    | 0.0            | 0.0           |
| 18     | -255.5      | -557.8 | -818.4     | 0.0    | 0.0    | 0.0    | 0.0    | 0.0            | 0.0           |

**RÉACTIONS : MOMENTS D'ENCASTREMENT par type de charge**

Aucun moment d'encastrement

\* Réactions d'appuis pour descentes de charges sur la structure porteuse(Bois, Béton...)

**RÉACTIONS PONDÉRÉES CARACTÉRISTIQUES AUX APPUIS (kN) \***

Unités : Efforts (daN)

| Appui | Type     | Réactions caractéristiques (+) |              |                  | Réactions caractéristiques (-) |         |                  |
|-------|----------|--------------------------------|--------------|------------------|--------------------------------|---------|------------------|
|       |          | Verticale (Rk)                 | Cas Déf      | Horizontale (Rk) | Verticale (Rk)                 | Cas Déf | Horizontale (Rk) |
| 1     | Rl Horiz | 12.845                         | ELU (NR 1) 2 | ----             | ----                           | ----    | ----             |
| 15    | Rl Horiz | 11.856                         | ELU (NR 2) 2 | ----             | ----                           | ----    | ----             |
| 16    | Arti     | 43.874                         | ELU (NR 2) 2 | 17.066           | ELU 2                          | ----    | ----             |
| 18    | Arti     | 44.622                         | ELU (NR 1) 2 | ----             | ----                           | ----    | -17.066          |

\* Réactions d'appuis caractéristiques à comparer aux valeurs des catalogues fournisseurs.

**EFFORTS ET CONTRAINTES DE CISAILLEMENT AUX EXTRÉMITÉS DES BARRES**

Unités : Efforts Normaux, Tranchants (daN) - Moments (daN.cm) - Cisaillement (daN/cm²)

**Cas ELU 1 : 1.35\*Permanente**

| Barres      | Noeuds | Efforts |            |         | Contrainte de cisaillement |      |        |      |      |      |      |
|-------------|--------|---------|------------|---------|----------------------------|------|--------|------|------|------|------|
|             |        | Normaux | Tranchants | Moments | Tranchant                  | Réel | Limite | Kcr  | Kmod | Gm   | Taux |
| Arbalétrier |        |         |            |         |                            |      |        |      |      |      |      |
| 1/2         | C 1    | 686.6   | -262.4     | 0       | -262.4                     | 4.20 | 15.69  | 0.67 | 0.60 | 1.30 | 27%  |
|             | 2      | -684.6  | 264.9      | -11864  | 264.9                      | 4.24 | 15.69  | 0.67 | 0.60 | 1.30 | 27%  |
| 2/3         | C 2    | 559.3   | -424.0     | 11864   | -424.0                     | 6.78 | 15.69  | 0.67 | 0.60 | 1.30 | 43%  |
|             | 3      | -557.0  | 427.0      | -33997  | 427.0                      | 6.83 | 15.69  | 0.67 | 0.60 | 1.30 | 44%  |
| 3/4         | C 3    | 769.4   | 420.0      | 33997   | 420.0                      | 6.72 | 15.69  | 0.67 | 0.60 | 1.30 | 43%  |
|             | 4      | -765.1  | -414.5     | 6885    | -414.5                     | 6.63 | 15.69  | 0.67 | 0.60 | 1.30 | 42%  |
| 4/5         | C 4    | 582.2   | 182.1      | -6885   | 182.1                      | 2.91 | 15.69  | 0.67 | 0.60 | 1.30 | 19%  |
|             | 5      | -578.7  | -177.6     | 21255   | -177.6                     | 2.84 | 15.69  | 0.67 | 0.60 | 1.30 | 18%  |
| 5/6         | C 5    | 941.9   | -125.0     | -21255  | -125.0                     | 2.00 | 15.69  | 0.67 | 0.60 | 1.30 | 13%  |
|             | 6      | -938.8  | 128.9      | 12354   | 128.9                      | 2.06 | 15.69  | 0.67 | 0.60 | 1.30 | 13%  |
| 6/7         | C 6    | 760.1   | -355.9     | -12354  | -355.9                     | 5.69 | 15.69  | 0.67 | 0.60 | 1.30 | 36%  |
|             | 7      | -757.9  | 358.8      | -5928   | 358.8                      | 5.74 | 15.69  | 0.67 | 0.60 | 1.30 | 37%  |
| 7/8         | C 7    | 215.7   | 55.7       | 5928    | 55.7                       | 0.89 | 15.69  | 0.67 | 0.60 | 1.30 | 6%   |
|             | 8      | -210.7  | -49.3      | 0       | -49.3                      | 0.79 | 15.69  | 0.67 | 0.60 | 1.30 | 5%   |
| 8/9         | C 8    | 189.1   | -21.9      | 0       | -21.9                      | 0.35 | 15.69  | 0.67 | 0.60 | 1.30 | 2%   |
|             | 9      | -194.1  | 28.3       | -2832   | 28.3                       | 0.45 | 15.69  | 0.67 | 0.60 | 1.30 | 3%   |
| 9/10        | C 9    | 736.3   | 386.3      | 2832    | 386.3                      | 6.18 | 15.69  | 0.67 | 0.60 | 1.30 | 39%  |
|             | 10     | -737.4  | -384.8     | 7244    | -384.8                     | 6.15 | 15.69  | 0.67 | 0.60 | 1.30 | 39%  |
| 10/11       | C 10   | 910.3   | 165.2      | -7244   | 165.2                      | 2.64 | 15.69  | 0.67 | 0.60 | 1.30 | 17%  |
|             | 11     | -914.5  | -159.8     | 22704   | -159.8                     | 2.56 | 15.69  | 0.67 | 0.60 | 1.30 | 16%  |
| 11/12       | C 11   | 551.2   | -142.8     | -22704  | -142.8                     | 2.28 | 15.69  | 0.67 | 0.60 | 1.30 | 15%  |
|             | 12     | -553.4  | 145.5      | 15805   | 145.5                      | 2.33 | 15.69  | 0.67 | 0.60 | 1.30 | 15%  |
| 12/13       | C 12   | 738.7   | -381.0     | -15805  | -381.0                     | 6.09 | 15.69  | 0.67 | 0.60 | 1.30 | 39%  |
|             | 13     | -744.5  | 388.3      | -34201  | 388.3                      | 6.21 | 15.69  | 0.67 | 0.60 | 1.30 | 40%  |
| 13/14       | C 13   | 510.5   | 474.7      | 34201   | 474.7                      | 7.59 | 15.69  | 0.67 | 0.60 | 1.30 | 48%  |
|             | 14     | -511.9  | -472.9     | -19039  | -472.9                     | 7.56 | 15.69  | 0.67 | 0.60 | 1.30 | 48%  |
| 14/15       | C 14   | 652.2   | 294.7      | 19039   | 294.7                      | 4.71 | 15.69  | 0.67 | 0.60 | 1.30 | 30%  |
|             | 15     | -655.1  | -291.0     | 0       | -291.0                     | 4.65 | 15.69  | 0.67 | 0.60 | 1.30 | 30%  |

|                |   |    |        |        |        |        |      |       |      |      |      |     |
|----------------|---|----|--------|--------|--------|--------|------|-------|------|------|------|-----|
| Entrait        |   |    |        |        |        |        |      |       |      |      |      |     |
| 5/20           | T | 5  | -472.6 | 13.1   | 0      | 13.1   | 0.14 | 15.69 | 0.67 | 0.60 | 1.30 | 1%  |
|                |   | 20 | 472.6  | 6.7    | 595    | 6.7    | 0.07 | 15.69 | 0.67 | 0.60 | 1.30 | 0%  |
| 20/11          | T | 20 | -472.6 | 6.7    | -595   | 6.7    | 0.07 | 15.69 | 0.67 | 0.60 | 1.30 | 0%  |
|                |   | 11 | 472.6  | 13.1   | 0      | 13.1   | 0.14 | 15.69 | 0.67 | 0.60 | 1.30 | 1%  |
| 7/9            | C | 7  | 682.4  | 9.6    | 0      | 9.6    | 0.10 | 15.69 | 0.67 | 0.60 | 1.30 | 1%  |
|                |   | 9  | -682.4 | 9.6    | 0      | 9.6    | 0.10 | 15.69 | 0.67 | 0.60 | 1.30 | 1%  |
| Poinçon        |   |    |        |        |        |        |      |       |      |      |      |     |
| 20/8           | T | 20 | -13.4  | 0.0    | 0      | 0.0    | 0.00 | 15.69 | 0.67 | 0.60 | 1.30 | 0%  |
|                |   | 8  | 23.8   | 0.0    | 0      | 0.0    | 0.00 | 15.69 | 0.67 | 0.60 | 1.30 | 0%  |
| Blochet        |   |    |        |        |        |        |      |       |      |      |      |     |
| 1/17           | T | 1  | -701.8 | 3.8    | 0      | 3.8    | 0.04 | 15.69 | 0.67 | 0.60 | 1.30 | 0%  |
|                |   | 17 | 701.8  | 3.8    | 0      | 3.8    | 0.04 | 15.69 | 0.67 | 0.60 | 1.30 | 0%  |
| 19/15          | T | 19 | -694.8 | 3.8    | 0      | 3.8    | 0.04 | 15.69 | 0.67 | 0.60 | 1.30 | 0%  |
|                |   | 15 | 694.8  | 3.8    | 0      | 3.8    | 0.04 | 15.69 | 0.67 | 0.60 | 1.30 | 0%  |
| Jambe de force |   |    |        |        |        |        |      |       |      |      |      |     |
| 16/17          | C | 16 | 842.9  | -261.1 | 0      | -261.1 | 4.18 | 15.69 | 0.67 | 0.60 | 1.30 | 27% |
|                |   | 17 | -835.7 | 261.8  | -26281 | 261.8  | 4.19 | 15.69 | 0.67 | 0.60 | 1.30 | 27% |
| 17/3           | C | 17 | 761.1  | 436.0  | 26281  | 436.0  | 6.97 | 15.69 | 0.67 | 0.60 | 1.30 | 44% |
|                |   | 3  | -756.8 | -435.6 | 0      | -435.6 | 6.97 | 15.69 | 0.67 | 0.60 | 1.30 | 44% |
| 13/19          | C | 13 | 783.4  | -431.2 | 0      | -431.2 | 6.90 | 15.69 | 0.67 | 0.60 | 1.30 | 44% |
|                |   | 19 | -787.7 | 431.6  | -26017 | 431.6  | 6.90 | 15.69 | 0.67 | 0.60 | 1.30 | 44% |
| 19/18          | C | 19 | 861.6  | 259.2  | 26017  | 259.2  | 4.15 | 15.69 | 0.67 | 0.60 | 1.30 | 26% |
|                |   | 18 | -868.8 | -258.5 | 0      | -258.5 | 4.13 | 15.69 | 0.67 | 0.60 | 1.30 | 26% |

Cas ELU 2 : 1.35\*Permanente + 1.5\*Neige

| Barres         | Noeuds | Efforts |            |         | Contrainte de cisaillement |         |        |       |      |      |      |       |
|----------------|--------|---------|------------|---------|----------------------------|---------|--------|-------|------|------|------|-------|
|                |        | Normaux | Tranchants | Moments | Tranchant                  | Réel    | Limite | Kcr   | Kmod | Gm   | Taux |       |
| Arbalétrier    |        |         |            |         |                            |         |        |       |      |      |      |       |
| 1/2            | C      | 1       | 2321.2     | -904.2  | 0                          | -904.2  | 14.46  | 23.54 | 0.67 | 0.90 | 1.30 | 61%   |
|                |        | 2       | -2227.3    | 1023.5  | -43372                     | 1023.5  | 16.37  | 23.54 | 0.67 | 0.90 | 1.30 | 70%   |
| 2/3            | C      | 2       | 1992.6     | -1321.7 | 43372                      | -1321.7 | 21.14  | 23.54 | 0.67 | 0.90 | 1.30 | 90%   |
|                |        | 3       | -1884.2    | 1459.5  | -115707                    | 1459.5  | 23.34  | 23.54 | 0.67 | 0.90 | 1.30 | 99%   |
| 3/4            | C      | 3       | 2688.5     | 1505.6  | 115707                     | 1505.6  | 24.08  | 23.54 | 0.67 | 0.90 | 1.30 | 102%* |
|                |        | 4       | -2484.1    | -1246.0 | 19099                      | -1246.0 | 19.93  | 23.54 | 0.67 | 0.90 | 1.30 | 85%   |
| 4/5            | C      | 4       | 2133.4     | 800.3   | -19099                     | 800.3   | 12.80  | 23.54 | 0.67 | 0.90 | 1.30 | 54%   |
|                |        | 5       | -1966.8    | -588.6  | 74574                      | -588.6  | 9.41   | 23.54 | 0.67 | 0.90 | 1.30 | 40%   |
| 5/6            | C      | 5       | 3211.8     | -424.2  | -74574                     | -424.2  | 6.78   | 23.54 | 0.67 | 0.90 | 1.30 | 29%   |
|                |        | 6       | -3065.5    | 610.0   | 38317                      | 610.0   | 9.75   | 23.54 | 0.67 | 0.90 | 1.30 | 41%   |
| 6/7            | C      | 6       | 2722.7     | -1045.7 | -38317                     | -1045.7 | 16.72  | 23.54 | 0.67 | 0.90 | 1.30 | 71%   |
|                |        | 7       | -2616.0    | 1181.2  | -18641                     | 1181.2  | 18.89  | 23.54 | 0.67 | 0.90 | 1.30 | 80%   |
| 7/8            | C      | 7       | 699.7      | 314.7   | 18641                      | 314.7   | 5.03   | 23.54 | 0.67 | 0.90 | 1.30 | 21%   |
|                |        | 8       | -464.3     | -15.6   | 0                          | -15.6   | 0.25   | 23.54 | 0.67 | 0.90 | 1.30 | 1%    |
| 8/9            | C      | 8       | 423.4      | 36.4    | 0                          | 36.4    | 0.58   | 23.54 | 0.67 | 0.90 | 1.30 | 2%    |
|                |        | 9       | -658.8     | 262.7   | -12766                     | 262.7   | 4.20   | 23.54 | 0.67 | 0.90 | 1.30 | 18%   |
| 9/10           | C      | 9       | 2575.0     | 1233.3  | 12766                      | 1233.3  | 19.72  | 23.54 | 0.67 | 0.90 | 1.30 | 84%   |
|                |        | 10      | -2629.5    | -1164.0 | 18563                      | -1164.0 | 18.61  | 23.54 | 0.67 | 0.90 | 1.30 | 79%   |
| 10/11          | C      | 10      | 2960.1     | 744.0   | -18563                     | 744.0   | 11.90  | 23.54 | 0.67 | 0.90 | 1.30 | 51%   |
|                |        | 11      | -3158.5    | -491.9  | 77354                      | -491.9  | 7.87   | 23.54 | 0.67 | 0.90 | 1.30 | 33%   |
| 11/12          | C      | 11      | 1913.5     | -520.9  | -77354                     | -520.9  | 8.33   | 23.54 | 0.67 | 0.90 | 1.30 | 35%   |
|                |        | 12      | -2013.3    | 647.7   | 49386                      | 647.7   | 10.36  | 23.54 | 0.67 | 0.90 | 1.30 | 44%   |
| 12/13          | C      | 12      | 2370.3     | -1101.3 | -49386                     | -1101.3 | 17.61  | 23.54 | 0.67 | 0.90 | 1.30 | 75%   |
|                |        | 13      | -2641.4    | 1445.8  | -116177                    | 1445.8  | 23.12  | 23.54 | 0.67 | 0.90 | 1.30 | 98%   |
| 13/14          | C      | 13      | 1794.1     | 1551.3  | 116177                     | 1551.3  | 24.81  | 23.54 | 0.67 | 0.90 | 1.30 | 105%* |
|                |        | 14      | -1860.8    | -1466.5 | -67888                     | -1466.5 | 23.45  | 23.54 | 0.67 | 0.90 | 1.30 | 100%  |
| 14/15          | C      | 14      | 2125.4     | 1130.3  | 67888                      | 1130.3  | 18.08  | 23.54 | 0.67 | 0.90 | 1.30 | 77%   |
|                |        | 15      | -2261.0    | -958.0  | 0                          | -958.0  | 15.32  | 23.54 | 0.67 | 0.90 | 1.30 | 65%   |
| Entrait        |        |         |            |         |                            |         |        |       |      |      |      |       |
| 5/20           | T      | 5       | -1604.7    | 25.9    | 0                          | 25.9    | 0.28   | 23.54 | 0.67 | 0.90 | 1.30 | 1%    |
|                |        | 20      | 1604.7     | -6.1    | 2947                       | -6.1    | 0.07   | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
| 20/11          | T      | 20      | -1604.7    | -6.1    | -2947                      | -6.1    | 0.07   | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
|                |        | 11      | 1604.7     | 25.9    | 0                          | 25.9    | 0.28   | 23.54 | 0.67 | 0.90 | 1.30 | 1%    |
| 7/9            | C      | 7       | 2431.0     | 9.6     | 0                          | 9.6     | 0.10   | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
|                |        | 9       | -2431.0    | 9.6     | 0                          | 9.6     | 0.10   | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
| Poinçon        |        |         |            |         |                            |         |        |       |      |      |      |       |
| 20/8           | C      | 20      | 12.2       | 0.0     | 0                          | 0.0     | 0.00   | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
|                |        | 8       | -1.8       | 0.0     | 0                          | 0.0     | 0.00   | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
| Blochet        |        |         |            |         |                            |         |        |       |      |      |      |       |
| 1/17           | T      | 1       | -2383.3    | 3.8     | 0                          | 3.8     | 0.04   | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
|                |        | 17      | 2383.3     | 3.8     | 0                          | 3.8     | 0.04   | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
| 19/15          | T      | 19      | -2369.3    | 3.8     | 0                          | 3.8     | 0.04   | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
|                |        | 15      | 2369.3     | 3.8     | 0                          | 3.8     | 0.04   | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
| Jambe de force |        |         |            |         |                            |         |        |       |      |      |      |       |
| 16/17          | C      | 16      | 2947.6     | -888.4  | 0                          | -888.4  | 14.21  | 23.54 | 0.67 | 0.90 | 1.30 | 60%   |
|                |        | 17      | -2940.5    | 889.2   | -89336                     | 889.2   | 14.22  | 23.54 | 0.67 | 0.90 | 1.30 | 60%   |
| 17/3           | C      | 17      | 2696.1     | 1481.5  | 89336                      | 1481.5  | 23.69  | 23.54 | 0.67 | 0.90 | 1.30 | 101%* |
|                |        | 3       | -2691.7    | -1481.1 | 0                          | -1481.1 | 23.68  | 23.54 | 0.67 | 0.90 | 1.30 | 101%* |
| 13/19          | C      | 13      | 2744.6     | -1472.4 | 0                          | -1472.4 | 23.55  | 23.54 | 0.67 | 0.90 | 1.30 | 100%* |
|                |        | 19      | -2748.9    | 1472.8  | -88811                     | 1472.8  | 23.55  | 23.54 | 0.67 | 0.90 | 1.30 | 100%* |
| 19/18          | C      | 19      | 2991.9     | 883.9   | 88811                      | 883.9   | 14.14  | 23.54 | 0.67 | 0.90 | 1.30 | 60%   |
|                |        | 18      | -2999.1    | -883.2  | 0                          | -883.2  | 14.12  | 23.54 | 0.67 | 0.90 | 1.30 | 60%   |

Cas ELU (Neige redistribuée 1) 2 : 1.35\*Permanente + 1.5\*Neige

| Barres      | Noeuds | Efforts |            |         | Contrainte de cisaillement |         |        |       |      |      |      |     |
|-------------|--------|---------|------------|---------|----------------------------|---------|--------|-------|------|------|------|-----|
|             |        | Normaux | Tranchants | Moments | Tranchant                  | Réel    | Limite | Kcr   | Kmod | Gm   | Taux |     |
| Arbalétrier |        |         |            |         |                            |         |        |       |      |      |      |     |
| 1/2         | C      | 1       | 2244.9     | -639.9  | 0                          | -639.9  | 10.23  | 23.54 | 0.67 | 0.90 | 1.30 | 43% |
|             |        | 2       | -2197.0    | 700.8   | -30165                     | 700.8   | 11.21  | 23.54 | 0.67 | 0.90 | 1.30 | 48% |
| 2/3         | C      | 2       | 2017.0     | -929.4  | 30165                      | -929.4  | 14.86  | 23.54 | 0.67 | 0.90 | 1.30 | 63% |
|             |        | 3       | -1961.6    | 999.8   | -80342                     | 999.8   | 15.99  | 23.54 | 0.67 | 0.90 | 1.30 | 68% |
| 3/4         | C      | 3       | 2031.0     | 1004.2  | 80342                      | 1004.2  | 16.06  | 23.54 | 0.67 | 0.90 | 1.30 | 68% |
|             |        | 4       | -1926.6    | -871.6  | 11554                      | -871.6  | 13.94  | 23.54 | 0.67 | 0.90 | 1.30 | 59% |
| 4/5         | C      | 4       | 1659.8     | 532.6   | -11554                     | 532.6   | 8.52   | 23.54 | 0.67 | 0.90 | 1.30 | 36% |
|             |        | 5       | -1574.7    | -424.5  | 49781                      | -424.5  | 6.79   | 23.54 | 0.67 | 0.90 | 1.30 | 29% |
| 5/6         | C      | 5       | 2605.8     | -416.0  | -49781                     | -416.0  | 6.65   | 23.54 | 0.67 | 0.90 | 1.30 | 28% |
|             |        | 6       | -2531.1    | 510.9   | 17288                      | 510.9   | 8.17   | 23.54 | 0.67 | 0.90 | 1.30 | 35% |
| 6/7         | C      | 6       | 2270.3     | -842.2  | -17288                     | -842.2  | 13.47  | 23.54 | 0.67 | 0.90 | 1.30 | 57% |
|             |        | 7       | -2215.9    | 911.4   | -27565                     | 911.4   | 14.57  | 23.54 | 0.67 | 0.90 | 1.30 | 62% |
| 7/8         | C      | 7       | 634.9      | 320.6   | 27565                      | 320.6   | 5.13   | 23.54 | 0.67 | 0.90 | 1.30 | 22% |
|             |        | 8       | -514.7     | -167.9  | 0                          | -167.9  | 2.68   | 23.54 | 0.67 | 0.90 | 1.30 | 11% |
| 8/9         | C      | 8       | 251.7      | 166.4   | 0                          | 166.4   | 2.66   | 23.54 | 0.67 | 0.90 | 1.30 | 11% |
|             |        | 9       | -487.1     | 132.7   | 1903                       | 132.7   | 2.12   | 23.54 | 0.67 | 0.90 | 1.30 | 9%  |
| 9/10        | C      | 9       | 2068.0     | 1099.3  | -1903                      | 1099.3  | 17.58  | 23.54 | 0.67 | 0.90 | 1.30 | 75% |
|             |        | 10      | -2122.5    | -1030.1 | 29730                      | -1030.1 | 16.47  | 23.54 | 0.67 | 0.90 | 1.30 | 70% |
| 10/11       | C      | 10      | 2453.0     | 610.1   | -29730                     | 610.1   | 9.76   | 23.54 | 0.67 | 0.90 | 1.30 | 41% |
|             |        | 11      | -2651.4    | -358.0  | 75778                      | -358.0  | 5.72   | 23.54 | 0.67 | 0.90 | 1.30 | 24% |
| 11/12       | C      | 11      | 1620.4     | -482.5  | -75778                     | -482.5  | 7.72   | 23.54 | 0.67 | 0.90 | 1.30 | 33% |
|             |        | 12      | -1720.2    | 609.3   | 49648                      | 609.3   | 9.74   | 23.54 | 0.67 | 0.90 | 1.30 | 41% |

|                |   |    |         |         |         |         |       |       |      |      |      |       |
|----------------|---|----|---------|---------|---------|---------|-------|-------|------|------|------|-------|
| Arbalétrier    |   |    |         |         |         |         |       |       |      |      |      |       |
| 12/13          | C | 12 | 2077.2  | -1062.9 | -49648  | -1062.9 | 17.00 | 23.54 | 0.67 | 0.90 | 1.30 | 72%   |
|                |   | 13 | -2348.3 | 1407.4  | -110923 | 1407.4  | 22.51 | 23.54 | 0.67 | 0.90 | 1.30 | 96%   |
| 13/14          | C | 13 | 1068.7  | 1497.2  | 110923  | 1497.2  | 23.94 | 23.54 | 0.67 | 0.90 | 1.30 | 102%* |
|                |   | 14 | -1135.4 | -1412.4 | -64367  | -1412.4 | 22.59 | 23.54 | 0.67 | 0.90 | 1.30 | 96%   |
| 14/15          | C | 14 | 1400.0  | 1076.2  | 64367   | 1076.2  | 17.21 | 23.54 | 0.67 | 0.90 | 1.30 | 73%   |
|                |   | 15 | -1535.6 | -903.9  | 0       | -903.9  | 14.45 | 23.54 | 0.67 | 0.90 | 1.30 | 61%   |
| Entrait        |   |    |         |         |         |         |       |       |      |      |      |       |
| 5/20           | T | 5  | -1330.0 | 22.8    | 0       | 22.8    | 0.24  | 23.54 | 0.67 | 0.90 | 1.30 | 1%    |
|                |   | 20 | 1330.0  | -3.0    | 2372    | -3.0    | 0.03  | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
| 20/11          | T | 20 | -1330.0 | -3.0    | -2372   | -3.0    | 0.03  | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
|                |   | 11 | 1330.0  | 22.8    | 0       | 22.8    | 0.24  | 23.54 | 0.67 | 0.90 | 1.30 | 1%    |
| 7/9            | C | 7  | 2004.3  | 9.6     | 0       | 9.6     | 0.10  | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
|                |   | 9  | -2004.3 | 9.6     | 0       | 9.6     | 0.10  | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
| Poinçon        |   |    |         |         |         |         |       |       |      |      |      |       |
| 20/8           | C | 20 | 6.0     | 0.0     | 0       | 0.0     | 0.00  | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
|                |   | 78 | 4.4     | 0.0     | 0       | 0.0     | 0.00  | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
| Blochet        |   |    |         |         |         |         |       |       |      |      |      |       |
| 1/17           | T | 1  | -2159.8 | 3.8     | 0       | 3.8     | 0.04  | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
|                |   | 17 | 2159.8  | 3.8     | 0       | 3.8     | 0.04  | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
| 19/15          | T | 19 | -1765.7 | 3.8     | 0       | 3.8     | 0.04  | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
|                |   | 15 | 1765.7  | 3.8     | 0       | 3.8     | 0.04  | 23.54 | 0.67 | 0.90 | 1.30 | 0%    |
| Jambe de force |   |    |         |         |         |         |       |       |      |      |      |       |
| 16/17          | C | 16 | 1723.1  | -805.1  | 0       | -805.1  | 12.87 | 23.54 | 0.67 | 0.90 | 1.30 | 55%   |
|                |   | 17 | -1715.9 | 805.8   | -80957  | 805.8   | 12.89 | 23.54 | 0.67 | 0.90 | 1.30 | 55%   |
| 17/3           | C | 17 | 1494.1  | 1342.6  | 80957   | 1342.6  | 21.47 | 23.54 | 0.67 | 0.90 | 1.30 | 91%   |
|                |   | 3  | -1489.8 | -1342.2 | 0       | -1342.2 | 21.46 | 23.54 | 0.67 | 0.90 | 1.30 | 91%   |
| 13/19          | C | 13 | 2978.3  | -1097.1 | 0       | -1097.1 | 17.54 | 23.54 | 0.67 | 0.90 | 1.30 | 75%   |
|                |   | 19 | -2982.6 | 1097.6  | -66178  | 1097.6  | 17.55 | 23.54 | 0.67 | 0.90 | 1.30 | 75%   |
| 19/18          | C | 19 | 3164.7  | 658.8   | 66178   | 658.8   | 10.53 | 23.54 | 0.67 | 0.90 | 1.30 | 45%   |
|                |   | 18 | -3171.8 | -658.0  | 0       | -658.0  | 10.52 | 23.54 | 0.67 | 0.90 | 1.30 | 45%   |

Cas ELU (Neige redistribuée 2) 2 : 1.35\*Permanente + 1.5\*Neige

| Barres         | Noeuds | Efforts |            |         | Contrainte de cisaillement |         |        |       |      |      |      |     |
|----------------|--------|---------|------------|---------|----------------------------|---------|--------|-------|------|------|------|-----|
|                |        | Normaux | Tranchants | Moments | Tranchant                  | Réel    | Limite | Kcr   | Kmod | Gm   | Taux |     |
| Arbalétrier    |        |         |            |         |                            |         |        |       |      |      |      |     |
| 1/2            | C      | 1       | 1580.2     | -847.6  | 0                          | -847.6  | 13.55  | 23.54 | 0.67 | 0.90 | 1.30 | 58% |
|                |        | 2       | -1486.3    | 966.9   | -40826                     | 966.9   | 15.46  | 23.54 | 0.67 | 0.90 | 1.30 | 66% |
| 2/3            | C      | 2       | 1251.6     | -1265.1 | 40826                      | -1265.1 | 20.23  | 23.54 | 0.67 | 0.90 | 1.30 | 86% |
|                |        | 3       | -1143.1    | 1402.9  | -110217                    | 1402.9  | 22.43  | 23.54 | 0.67 | 0.90 | 1.30 | 95% |
| 3/4            | C      | 3       | 2386.5     | 1464.3  | 110217                     | 1464.3  | 23.42  | 23.54 | 0.67 | 0.90 | 1.30 | 99% |
|                |        | 4       | -2182.1    | -1204.6 | 20537                      | -1204.6 | 19.26  | 23.54 | 0.67 | 0.90 | 1.30 | 82% |
| 4/5            | C      | 4       | 1831.4     | 758.9   | -20537                     | 758.9   | 12.14  | 23.54 | 0.67 | 0.90 | 1.30 | 52% |
|                |        | 5       | -1664.8    | -547.3  | 72708                      | -547.3  | 8.75   | 23.54 | 0.67 | 0.90 | 1.30 | 37% |
| 5/6            | C      | 5       | 2682.8     | -282.8  | -72708                     | -282.8  | 4.52   | 23.54 | 0.67 | 0.90 | 1.30 | 19% |
|                |        | 6       | -2536.6    | 468.6   | 46365                      | 468.6   | 7.49   | 23.54 | 0.67 | 0.90 | 1.30 | 32% |
| 6/7            | C      | 6       | 2193.7     | -904.3  | -46365                     | -904.3  | 14.46  | 23.54 | 0.67 | 0.90 | 1.30 | 61% |
|                |        | 7       | -2087.1    | 1039.8  | -3360                      | 1039.8  | 16.63  | 23.54 | 0.67 | 0.90 | 1.30 | 71% |
| 7/8            | C      | 7       | 522.5      | 179.3   | 3360                       | 179.3   | 2.87   | 23.54 | 0.67 | 0.90 | 1.30 | 12% |
|                |        | 8       | -287.1     | 119.8   | 0                          | 119.8   | 1.92   | 23.54 | 0.67 | 0.90 | 1.30 | 8%  |
| 8/9            | C      | 8       | 477.9      | -122.7  | 0                          | -122.7  | 1.96   | 23.54 | 0.67 | 0.90 | 1.30 | 8%  |
|                |        | 9       | -598.1     | 275.4   | -22467                     | 275.4   | 4.40   | 23.54 | 0.67 | 0.90 | 1.30 | 19% |
| 9/10           | C      | 9       | 2162.7     | 943.7   | 22467                      | 943.7   | 15.09  | 23.54 | 0.67 | 0.90 | 1.30 | 64% |
|                |        | 10      | -2190.5    | -908.4  | 1736                       | -908.4  | 14.53  | 23.54 | 0.67 | 0.90 | 1.30 | 62% |
| 10/11          | C      | 10      | 2442.2     | 588.6   | -1736                      | 588.6   | 9.41   | 23.54 | 0.67 | 0.90 | 1.30 | 40% |
|                |        | 11      | -2543.5    | -459.8  | 51605                      | -459.8  | 7.35   | 23.54 | 0.67 | 0.90 | 1.30 | 31% |
| 11/12          | C      | 11      | 1525.5     | -370.2  | -51605                     | -370.2  | 5.92   | 23.54 | 0.67 | 0.90 | 1.30 | 25% |
|                |        | 12      | -1576.4    | 435.0   | 32334                      | 435.0   | 6.96   | 23.54 | 0.67 | 0.90 | 1.30 | 30% |
| 12/13          | C      | 12      | 1847.6     | -779.6  | -32334                     | -779.6  | 12.47  | 23.54 | 0.67 | 0.90 | 1.30 | 53% |
|                |        | 13      | -1986.0    | 955.5   | -80443                     | 955.5   | 15.28  | 23.54 | 0.67 | 0.90 | 1.30 | 65% |
| 13/14          | C      | 13      | 1877.7     | 1067.2  | 80443                      | 1067.2  | 17.07  | 23.54 | 0.67 | 0.90 | 1.30 | 73% |
|                |        | 14      | -1911.8    | -1023.9 | -46984                     | -1023.9 | 16.37  | 23.54 | 0.67 | 0.90 | 1.30 | 70% |
| 14/15          | C      | 14      | 2114.2     | 766.7   | 46984                      | 766.7   | 12.26  | 23.54 | 0.67 | 0.90 | 1.30 | 52% |
|                |        | 15      | -2183.5    | -678.7  | 0                          | -678.7  | 10.85  | 23.54 | 0.67 | 0.90 | 1.30 | 46% |
| Entrait        |        |         |            |         |                            |         |        |       |      |      |      |     |
| 5/20           | T      | 5       | -1313.4    | 22.7    | 0                          | 22.7    | 0.24   | 23.54 | 0.67 | 0.90 | 1.30 | 1%  |
|                |        | 20      | 1313.4     | -2.8    | 2345                       | -2.8    | 0.03   | 23.54 | 0.67 | 0.90 | 1.30 | 0%  |
| 20/11          | T      | 20      | -1313.4    | -2.8    | -2345                      | -2.8    | 0.03   | 23.54 | 0.67 | 0.90 | 1.30 | 0%  |
|                |        | 11      | 1313.4     | 22.7    | 0                          | 22.7    | 0.24   | 23.54 | 0.67 | 0.90 | 1.30 | 1%  |
| 7/9            | C      | 7       | 1983.5     | 9.6     | 0                          | 9.6     | 0.10   | 23.54 | 0.67 | 0.90 | 1.30 | 0%  |
|                |        | 9       | -1983.5    | 9.6     | 0                          | 9.6     | 0.10   | 23.54 | 0.67 | 0.90 | 1.30 | 0%  |
| Poinçon        |        |         |            |         |                            |         |        |       |      |      |      |     |
| 20/8           | C      | 20      | 5.7        | 0.0     | 0                          | 0.0     | 0.00   | 23.54 | 0.67 | 0.90 | 1.30 | 0%  |
|                |        | 78      | 4.7        | 0.0     | 0                          | 0.0     | 0.00   | 23.54 | 0.67 | 0.90 | 1.30 | 0%  |
| Blochet        |        |         |            |         |                            |         |        |       |      |      |      |     |
| 1/17           | T      | 1       | -1765.9    | 3.8     | 0                          | 3.8     | 0.04   | 23.54 | 0.67 | 0.90 | 1.30 | 0%  |
|                |        | 17      | 1765.9     | 3.8     | 0                          | 3.8     | 0.04   | 23.54 | 0.67 | 0.90 | 1.30 | 0%  |
| 19/15          | T      | 19      | -2135.6    | 3.8     | 0                          | 3.8     | 0.04   | 23.54 | 0.67 | 0.90 | 1.30 | 0%  |
|                |        | 15      | 2135.6     | 3.8     | 0                          | 3.8     | 0.04   | 23.54 | 0.67 | 0.90 | 1.30 | 0%  |
| Jambe de force |        |         |            |         |                            |         |        |       |      |      |      |     |
| 16/17          | C      | 16      | 3119.8     | -658.1  | 0                          | -658.1  | 10.52  | 23.54 | 0.67 | 0.90 | 1.30 | 45% |
|                |        | 17      | -3112.6    | 658.8   | -66187                     | 658.8   | 10.54  | 23.54 | 0.67 | 0.90 | 1.30 | 45% |
| 17/3           | C      | 17      | 2930.5     | 1097.7  | 66187                      | 1097.7  | 17.55  | 23.54 | 0.67 | 0.90 | 1.30 | 75% |
|                |        | 3       | -2926.2    | -1097.3 | 0                          | -1097.3 | 17.55  | 23.54 | 0.67 | 0.90 | 1.30 | 75% |
| 13/19          | C      | 13      | 1530.2     | -1327.1 | 0                          | -1327.1 | 21.22  | 23.54 | 0.67 | 0.90 | 1.30 | 90% |
|                |        | 19      | -1534.6    | 1327.5  | -80047                     | 1327.5  | 21.23  | 23.54 | 0.67 | 0.90 | 1.30 | 90% |
| 19/18          | C      | 19      | 1754.0     | 796.7   | 80047                      | 796.7   | 12.74  | 23.54 | 0.67 | 0.90 | 1.30 | 54% |
|                |        | 18      | -1761.1    | -796.0  | 0                          | -796.0  | 12.73  | 23.54 | 0.67 | 0.90 | 1.30 | 54% |

Cas ELU (Neige Exceptionnelle) 2 (Accidentelle) : Permanente + Neige EXC.

| Barres      | Noeuds | Efforts |            |         | Contrainte de cisaillement |         |        |       |      |      |      |     |
|-------------|--------|---------|------------|---------|----------------------------|---------|--------|-------|------|------|------|-----|
|             |        | Normaux | Tranchants | Moments | Tranchant                  | Réel    | Limite | Kcr   | Kmod | Gm   | Taux |     |
| Arbalétrier |        |         |            |         |                            |         |        |       |      |      |      |     |
| 1/2         | C      | 1       | 2102.7     | -822.6  | 0                          | -822.6  | 13.16  | 37.40 | 0.67 | 1.10 | 1.00 | 35% |
|             |        | 2       | -1996.2    | 957.9   | -40063                     | 957.9   | 15.32  | 37.40 | 0.67 | 1.10 | 1.00 | 41% |
| 2/3         | C      | 2       | 1830.5     | -1168.5 | 40063                      | -1168.5 | 18.69  | 37.40 | 0.67 | 1.10 | 1.00 | 50% |
|             |        | 3       | -1707.4    | 1324.9  | -104912                    | 1324.9  | 21.19  | 37.40 | 0.67 | 1.10 | 1.00 | 57% |
| 3/4         | C      | 3       | 2454.6     | 1382.5  | 104912                     | 1382.5  | 22.11  | 37.40 | 0.67 | 1.10 | 1.00 | 59% |
|             |        | 4       | -2222.8    | -1088.0 | 16121                      | -1088.0 | 17.40  | 37.40 | 0.67 | 1.10 | 1.00 | 47% |
| 4/5         | C      | 4       | 1975.4     | 773.7   | -16121                     | 773.7   | 12.37  | 37.40 | 0.67 | 1.10 | 1.00 | 33% |
|             |        | 5       | -1786.4    | -533.5  | 68332                      | -533.5  | 8.53   | 37.40 | 0.67 | 1.10 | 1.00 | 23% |
| 5/6         | C      | 5       | 2920.8     | -387.5  | -68332                     | -387.5  | 6.20   | 37.40 | 0.67 | 1.10 | 1.00 | 17% |
|             |        | 6       | -2754.9    | 598.2   | 33775                      | 598.2   | 9.57   | 37.40 | 0.67 | 1.10 | 1.00 | 26% |
| 6/7         | C      | 6       | 2513.1     | -905.5  | -33775                     | -905.5  | 14.48  | 37.40 | 0.67 | 1.10 | 1.00 | 39% |
|             |        | 7       | -2392.1    | 1059.3  | -16478                     | 1059.3  | 16.94  | 37.40 | 0.67 | 1.10 | 1.00 | 45% |
| 7/8         | C      | 7       | 633.6      | 315.6   | 16478                      | 315.6   | 5.05   | 37.40 | 0.67 | 1.10 | 1.00 | 13% |
|             |        | 8       | -366.7     | 23.6    | 0                          | 23.6    | 0.38   | 37.40 | 0.67 | 1.10 | 1.00 | 1%  |
| 8/9         | C      | 8       | 337.8      | 60.3    | 0                          | 60.3    | 0.96   | 37.40 | 0.67 | 1.10 | 1.00 | 3%  |
|             |        | 9       | -          |         |                            |         |        |       |      |      |      |     |

|                |   |    |         |         |         |         |       |       |      |      |      |     |  |
|----------------|---|----|---------|---------|---------|---------|-------|-------|------|------|------|-----|--|
| Arbalétrier    |   |    |         |         |         |         |       |       |      |      |      |     |  |
| 9/10           | C | 9  | 2363.2  | 1095.9  | 12337   | 1095.9  | 17.53 | 37.40 | 0.67 | 1.10 | 1.00 | 47% |  |
|                |   | 10 | -2425.0 | -1017.4 | 15280   | -1017.4 | 16.27 | 37.40 | 0.67 | 1.10 | 1.00 | 44% |  |
| 10/11          | C | 10 | 2658.2  | 721.1   | -15280  | 721.1   | 11.53 | 37.40 | 0.67 | 1.10 | 1.00 | 31% |  |
|                |   | 11 | -2883.2 | -435.1  | 70281   | -435.1  | 6.96  | 37.40 | 0.67 | 1.10 | 1.00 | 19% |  |
| 11/12          | C | 11 | 1748.9  | -485.8  | -70281  | -485.8  | 7.77  | 37.40 | 0.67 | 1.10 | 1.00 | 21% |  |
|                |   | 12 | -1862.1 | 629.7   | 43582   | 629.7   | 10.07 | 37.40 | 0.67 | 1.10 | 1.00 | 27% |  |
| 12/13          | C | 12 | 2113.8  | -949.6  | -43582  | -949.6  | 15.18 | 37.40 | 0.67 | 1.10 | 1.00 | 41% |  |
|                |   | 13 | -2421.4 | 1340.3  | -105260 | 1340.3  | 21.43 | 37.40 | 0.67 | 1.10 | 1.00 | 57% |  |
| 13/14          | C | 13 | 1643.6  | 1389.8  | 105260  | 1389.8  | 22.23 | 37.40 | 0.67 | 1.10 | 1.00 | 59% |  |
|                |   | 14 | -1719.3 | -1293.6 | -62322  | -1293.6 | 20.69 | 37.40 | 0.67 | 1.10 | 1.00 | 55% |  |
| 14/15          | C | 14 | 1906.1  | 1056.3  | 62322   | 1056.3  | 16.89 | 37.40 | 0.67 | 1.10 | 1.00 | 45% |  |
|                |   | 15 | -2059.9 | -860.9  | 0       | -860.9  | 13.77 | 37.40 | 0.67 | 1.10 | 1.00 | 37% |  |
| Entrait        |   |    |         |         |         |         |       |       |      |      |      |     |  |
| 5/20           | T | 5  | -1461.0 | 22.2    | 0       | 22.2    | 0.24  | 37.40 | 0.67 | 1.10 | 1.00 | 1%  |  |
|                |   | 20 | 1461.0  | -7.5    | 2733    | -7.5    | 0.08  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |  |
| 20/11          | T | 20 | -1461.0 | -7.5    | -2733   | -7.5    | 0.08  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |  |
|                |   | 11 | 1461.0  | 22.2    | 0       | 22.2    | 0.24  | 37.40 | 0.67 | 1.10 | 1.00 | 1%  |  |
| 7/9            | C | 7  | 2232.1  | 7.1     | 0       | 7.1     | 0.08  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |  |
|                |   | 9  | -2232.1 | 7.1     | 0       | 7.1     | 0.08  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |  |
| Poinçon        |   |    |         |         |         |         |       |       |      |      |      |     |  |
| 20/8           | C | 20 | 15.0    | 0.0     | 0       | 0.0     | 0.00  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |  |
|                |   | 8  | -7.3    | 0.0     | 0       | 0.0     | 0.00  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |  |
| Bloch          |   |    |         |         |         |         |       |       |      |      |      |     |  |
| 1/17           | T | 1  | -2161.1 | 2.8     | 0       | 2.8     | 0.03  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |  |
|                |   | 17 | 2161.1  | 2.8     | 0       | 2.8     | 0.03  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |  |
| 19/15          | T | 19 | -2151.1 | 2.8     | 0       | 2.8     | 0.03  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |  |
|                |   | 15 | 2151.1  | 2.8     | 0       | 2.8     | 0.03  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |  |
| Jambe de force |   |    |         |         |         |         |       |       |      |      |      |     |  |
| 16/17          | C | 16 | 2696.1  | -805.7  | 0       | -805.7  | 12.88 | 37.40 | 0.67 | 1.10 | 1.00 | 34% |  |
|                |   | 17 | -2690.8 | 806.3   | -81014  | 806.3   | 12.89 | 37.40 | 0.67 | 1.10 | 1.00 | 34% |  |
| 17/3           | C | 17 | 2469.8  | 1343.5  | 81014   | 1343.5  | 21.48 | 37.40 | 0.67 | 1.10 | 1.00 | 57% |  |
|                |   | 3  | -2466.6 | -1343.2 | 0       | -1343.2 | 21.48 | 37.40 | 0.67 | 1.10 | 1.00 | 57% |  |
| 13/19          | C | 13 | 2504.2  | -1337.0 | 0       | -1337.0 | 21.38 | 37.40 | 0.67 | 1.10 | 1.00 | 57% |  |
|                |   | 19 | -2507.4 | 1337.3  | -80641  | 1337.3  | 21.39 | 37.40 | 0.67 | 1.10 | 1.00 | 57% |  |
| 19/18          | C | 19 | 2727.4  | 802.6   | 80641   | 802.6   | 12.83 | 37.40 | 0.67 | 1.10 | 1.00 | 34% |  |
|                |   | 18 | -2732.7 | -802.0  | 0       | -802.0  | 12.83 | 37.40 | 0.67 | 1.10 | 1.00 | 34% |  |

Cas ELU (Neige Exceptionnelle redistribuée 1) 2 (Accidentelle) : Permanente + Neige EXC.

| Barres         | Noeuds | Efforts |            |         | Contrainte de cisaillement |         |        |       |      |      |      |     |
|----------------|--------|---------|------------|---------|----------------------------|---------|--------|-------|------|------|------|-----|
|                |        | Normaux | Tranchants | Moments | Tranchant                  | Réel    | Limite | Kcr   | Kmod | Gm   | Taux |     |
| Arbalétrier    |        |         |            |         |                            |         |        |       |      |      |      |     |
| 1/2            | C      | 1       | 2029.5     | -562.7  | 0                          | -562.7  | 9.00   | 37.40 | 0.67 | 1.10 | 1.00 | 24% |
|                |        | 2       | -1975.5    | 631.3   | -26865                     | 631.3   | 10.10  | 37.40 | 0.67 | 1.10 | 1.00 | 27% |
| 2/3            | C      | 2       | 1846.3     | -795.5  | 26865                      | -795.5  | 12.72  | 37.40 | 0.67 | 1.10 | 1.00 | 34% |
|                |        | 3       | -1783.9    | 874.8   | -70308                     | 874.8   | 13.99  | 37.40 | 0.67 | 1.10 | 1.00 | 37% |
| 3/4            | C      | 3       | 1805.9     | 886.2   | 70308                      | 886.2   | 14.17  | 37.40 | 0.67 | 1.10 | 1.00 | 38% |
|                |        | 4       | -1688.3    | -736.9  | 9213                       | -736.9  | 11.78  | 37.40 | 0.67 | 1.10 | 1.00 | 32% |
| 4/5            | C      | 4       | 1496.9     | 493.7   | -9213                      | 493.7   | 7.90   | 37.40 | 0.67 | 1.10 | 1.00 | 21% |
|                |        | 5       | -1401.1    | -372.0  | 43789                      | -372.0  | 5.95   | 37.40 | 0.67 | 1.10 | 1.00 | 16% |
| 5/6            | C      | 5       | 2323.5     | -378.2  | -43789                     | -378.2  | 6.05   | 37.40 | 0.67 | 1.10 | 1.00 | 16% |
|                |        | 6       | -2239.4    | 485.1   | 13523                      | 485.1   | 7.76   | 37.40 | 0.67 | 1.10 | 1.00 | 21% |
| 6/7            | C      | 6       | 2052.3     | -722.8  | -13523                     | -722.8  | 11.56  | 37.40 | 0.67 | 1.10 | 1.00 | 31% |
|                |        | 7       | -1990.9    | 800.7   | -25445                     | 800.7   | 12.81  | 37.40 | 0.67 | 1.10 | 1.00 | 34% |
| 7/8            | C      | 7       | 566.3      | 311.4   | 25445                      | 311.4   | 4.98   | 37.40 | 0.67 | 1.10 | 1.00 | 13% |
|                |        | 8       | -430.9     | -139.5  | 0                          | -139.5  | 2.23   | 37.40 | 0.67 | 1.10 | 1.00 | 6%  |
| 8/9            | C      | 8       | 171.9      | 189.7   | 0                          | 189.7   | 3.03   | 37.40 | 0.67 | 1.10 | 1.00 | 8%  |
|                |        | 9       | -438.9     | 149.5   | 2267                       | 149.5   | 2.39   | 37.40 | 0.67 | 1.10 | 1.00 | 6%  |
| 9/10           | C      | 9       | 1863.5     | 962.7   | -2267                      | 962.7   | 15.39  | 37.40 | 0.67 | 1.10 | 1.00 | 41% |
|                |        | 10      | -1925.4    | -884.1  | 26401                      | -884.1  | 14.14  | 37.40 | 0.67 | 1.10 | 1.00 | 38% |
| 10/11          | C      | 10      | 2158.5     | 587.8   | -26401                     | 587.8   | 9.40   | 37.40 | 0.67 | 1.10 | 1.00 | 25% |
|                |        | 11      | -2383.6    | -301.9  | 68721                      | -301.9  | 4.83   | 37.40 | 0.67 | 1.10 | 1.00 | 13% |
| 11/12          | C      | 11      | 1461.2     | -448.4  | -68721                     | -448.4  | 7.17   | 37.40 | 0.67 | 1.10 | 1.00 | 19% |
|                |        | 12      | -1574.5    | 592.2   | 43818                      | 592.2   | 9.47   | 37.40 | 0.67 | 1.10 | 1.00 | 25% |
| 12/13          | C      | 12      | 1826.2     | -912.1  | -43818                     | -912.1  | 14.59  | 37.40 | 0.67 | 1.10 | 1.00 | 39% |
|                |        | 13      | -2133.7    | 1302.8  | -100150                    | 1302.8  | 20.83  | 37.40 | 0.67 | 1.10 | 1.00 | 56% |
| 13/14          | C      | 13      | 930.5      | 1337.1  | 100150                     | 1337.1  | 21.38  | 37.40 | 0.67 | 1.10 | 1.00 | 57% |
|                |        | 14      | -1006.2    | -1241.0 | -58898                     | -1241.0 | 19.84  | 37.40 | 0.67 | 1.10 | 1.00 | 53% |
| 14/15          | C      | 14      | 1193.0     | 1003.6  | 58898                      | 1003.6  | 16.05  | 37.40 | 0.67 | 1.10 | 1.00 | 43% |
|                |        | 15      | -1346.8    | -808.2  | 0                          | -808.2  | 12.92  | 37.40 | 0.67 | 1.10 | 1.00 | 35% |
| Entrait        |        |         |            |         |                            |         |        |       |      |      |      |     |
| 5/20           | T      | 5       | -1188.8    | 19.1    | 0                          | 19.1    | 0.20   | 37.40 | 0.67 | 1.10 | 1.00 | 1%  |
|                |        | 20      | 1188.8     | -4.4    | 2169                       | -4.4    | 0.05   | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
| 20/11          | T      | 20      | -1188.8    | -4.4    | -2169                      | -4.4    | 0.05   | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
|                |        | 11      | 1188.8     | 19.1    | 0                          | 19.1    | 0.20   | 37.40 | 0.67 | 1.10 | 1.00 | 1%  |
| 7/9            | C      | 7       | 1807.4     | 7.1     | 0                          | 7.1     | 0.08   | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
|                |        | 9       | -1807.4    | 7.1     | 0                          | 7.1     | 0.08   | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
| Poinçon        |        |         |            |         |                            |         |        |       |      |      |      |     |
| 20/8           | C      | 20      | 8.9        | 0.0     | 0                          | 0.0     | 0.00   | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
|                |        | 8       | -1.2       | 0.0     | 0                          | 0.0     | 0.00   | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
| Bloch          |        |         |            |         |                            |         |        |       |      |      |      |     |
| 1/17           | T      | 1       | -1942.8    | 2.8     | 0                          | 2.8     | 0.03   | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
|                |        | 17      | 1942.8     | 2.8     | 0                          | 2.8     | 0.03   | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
| 19/15          | T      | 19      | -1558.2    | 2.8     | 0                          | 2.8     | 0.03   | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
|                |        | 15      | 1558.2     | 2.8     | 0                          | 2.8     | 0.03   | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
| Jambe de force |        |         |            |         |                            |         |        |       |      |      |      |     |
| 16/17          | C      | 16      | 1489.6     | -724.3  | 0                          | -724.3  | 11.58  | 37.40 | 0.67 | 1.10 | 1.00 | 31% |
|                |        | 17      | -1484.2    | 724.8   | -72829                     | 724.8   | 11.59  | 37.40 | 0.67 | 1.10 | 1.00 | 31% |
| 17/3           | C      | 17      | 1285.3     | 1207.8  | 72829                      | 1207.8  | 19.31  | 37.40 | 0.67 | 1.10 | 1.00 | 52% |
|                |        | 3       | -1282.1    | -1207.4 | 0                          | -1207.4 | 19.31  | 37.40 | 0.67 | 1.10 | 1.00 | 52% |
| 13/19          | C      | 13      | 2734.9     | -968.3  | 0                          | -968.3  | 15.48  | 37.40 | 0.67 | 1.10 | 1.00 | 41% |
|                |        | 19      | -2738.1    | 968.6   | -58404                     | 968.6   | 15.49  | 37.40 | 0.67 | 1.10 | 1.00 | 41% |
| 19/18          | C      | 19      | 2898.2     | 581.3   | 58404                      | 581.3   | 9.30   | 37.40 | 0.67 | 1.10 | 1.00 | 25% |
|                |        | 18      | -2903.5    | -580.8  | 0                          | -580.8  | 9.29   | 37.40 | 0.67 | 1.10 | 1.00 | 25% |

Cas ELU (Neige Exceptionnelle redistribuée 2) 2 (Accidentelle) : Permanente + Neige EXC.

| Barres      | Noeuds | Efforts |            |         | Contrainte de cisaillement |         |        |       |      |      |      |     |
|-------------|--------|---------|------------|---------|----------------------------|---------|--------|-------|------|------|------|-----|
|             |        | Normaux | Tranchants | Moments | Tranchant                  | Réel    | Limite | Kcr   | Kmod | Gm   | Taux |     |
| Arbalétrier |        |         |            |         |                            |         |        |       |      |      |      |     |
| 1/2         | C      | 1       | 1378.8     | -768.4  | 0                          | -768.4  | 12.29  | 37.40 | 0.67 | 1.10 | 1.00 | 33% |
|             |        | 2       | -1272.4    | 903.7   | -37622                     | 903.7   | 14.45  | 37.40 | 0.67 | 1.10 | 1.00 | 39% |
| 2/3         | C      | 2       | 1106.6     | -1114.3 | 37622                      | -1114.3 | 17.82  | 37.40 | 0.67 | 1.10 | 1.00 | 48% |
|             |        | 3       | -983.6     | 1270.6  | -99651                     | 1270.6  | 20.32  | 37.40 | 0.67 | 1.10 | 1.00 | 54% |
| 3/4         | C      | 3       | 2160.9     | 1343.1  | 99651                      | 1343.1  | 21.48  | 37.40 | 0.67 | 1.10 | 1.00 | 57% |
|             |        | 4       | -1929.2    | -1048.6 | 17519                      | -1048.6 | 16.77  | 37.40 | 0.67 | 1.10 | 1.00 | 45% |
| 4/5         | C      | 4       | 1681.8     | 734.2   | -17519                     | 734.2   | 11.74  | 37.40 | 0.67 | 1.10 | 1.00 | 31% |
|             |        | 5       | -1492.8    | -494.1  | 66580                      | -494.1  | 7.90   | 37.40 | 0.67 | 1.10 | 1.00 | 21% |
| 5/6         | C      | 5       | 2406.6     | -249.2  | -66580                     | -249.2  | 3.99   | 37.40 | 0.67 | 1.10 | 1.00 | 11% |
|             |        | 6       | -2240.7    | 460.0   | 41715                      | 460.0   | 7.36   | 37.40 | 0.67 | 1.10 | 1.00 | 20% |

|                |   |    |         |         |        |         |       |       |      |      |      |     |
|----------------|---|----|---------|---------|--------|---------|-------|-------|------|------|------|-----|
| Arbalétrier    |   |    |         |         |        |         |       |       |      |      |      |     |
| 6/7            | C | 6  | 1998.9  | -767.3  | -41715 | -767.3  | 12.27 | 37.40 | 0.67 | 1.10 | 1.00 | 33% |
|                |   | 7  | -1877.9 | 921.0   | -1467  | 921.0   | 14.73 | 37.40 | 0.67 | 1.10 | 1.00 | 39% |
| 7/8            | C | 7  | 464.1   | 182.6   | 1467   | 182.6   | 2.92  | 37.40 | 0.67 | 1.10 | 1.00 | 8%  |
|                |   | 8  | -197.1  | 156.6   | 0      | 156.6   | 2.50  | 37.40 | 0.67 | 1.10 | 1.00 | 7%  |
| 8/9            | C | 8  | 404.8   | -107.4  | 0      | -107.4  | 1.72  | 37.40 | 0.67 | 1.10 | 1.00 | 5%  |
|                |   | 9  | -540.2  | 279.3   | -21822 | 279.3   | 4.47  | 37.40 | 0.67 | 1.10 | 1.00 | 12% |
| 9/10           | C | 9  | 1954.0  | 824.3   | 21822  | 824.3   | 13.18 | 37.40 | 0.67 | 1.10 | 1.00 | 35% |
|                |   | 10 | -1985.3 | -784.5  | -798   | -784.5  | 12.55 | 37.40 | 0.67 | 1.10 | 1.00 | 34% |
| 10/11          | C | 10 | 2165.9  | 555.0   | 798    | 555.0   | 8.88  | 37.40 | 0.67 | 1.10 | 1.00 | 24% |
|                |   | 11 | -2280.0 | -410.0  | 45108  | -410.0  | 6.56  | 37.40 | 0.67 | 1.10 | 1.00 | 18% |
| 11/12          | C | 11 | 1366.2  | -333.3  | -45108 | -333.3  | 5.33  | 37.40 | 0.67 | 1.10 | 1.00 | 14% |
|                |   | 12 | -1423.6 | 406.2   | 27409  | 406.2   | 6.50  | 37.40 | 0.67 | 1.10 | 1.00 | 17% |
| 12/13          | C | 12 | 1618.1  | -653.4  | -27409 | -653.4  | 10.45 | 37.40 | 0.67 | 1.10 | 1.00 | 28% |
|                |   | 13 | -1774.1 | 851.5   | -70407 | 851.5   | 13.62 | 37.40 | 0.67 | 1.10 | 1.00 | 36% |
| 13/14          | C | 13 | 1724.0  | 923.4   | 70407  | 923.4   | 14.77 | 37.40 | 0.67 | 1.10 | 1.00 | 39% |
|                |   | 14 | -1762.4 | -874.6  | -41637 | -874.6  | 13.99 | 37.40 | 0.67 | 1.10 | 1.00 | 37% |
| 14/15          | C | 14 | 1907.7  | 690.0   | 41637  | 690.0   | 11.03 | 37.40 | 0.67 | 1.10 | 1.00 | 30% |
|                |   | 15 | -1985.7 | -590.9  | 0      | -590.9  | 9.45  | 37.40 | 0.67 | 1.10 | 1.00 | 25% |
| Entrait        |   |    |         |         |        |         |       |       |      |      |      |     |
| 5/20           | T | 5  | -1177.8 | 19.0    | 0      | 19.0    | 0.20  | 37.40 | 0.67 | 1.10 | 1.00 | 1%  |
|                |   | 20 | 1177.8  | -4.3    | 2151   | -4.3    | 0.05  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
| 20/11          | T | 20 | -1177.8 | -4.3    | -2151  | -4.3    | 0.05  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
|                |   | 11 | 1177.8  | 19.0    | 0      | 19.0    | 0.20  | 37.40 | 0.67 | 1.10 | 1.00 | 1%  |
| 7/9            | C | 7  | 1793.6  | 7.1     | 0      | 7.1     | 0.08  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
|                |   | 9  | -1793.6 | 7.1     | 0      | 7.1     | 0.08  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
| Poinçon        |   |    |         |         |        |         |       |       |      |      |      |     |
| 20/8           | C | 20 | 8.7     | 0.0     | 0      | 0.0     | 0.00  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
|                |   | 8  | -1.0    | 0.0     | 0      | 0.0     | 0.00  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
| Bloch          |   |    |         |         |        |         |       |       |      |      |      |     |
| 1/17           | T | 1  | -1558.7 | 2.8     | 0      | 2.8     | 0.03  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
|                |   | 17 | 1558.7  | 2.8     | 0      | 2.8     | 0.03  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
| 19/15          | T | 19 | -1925.9 | 2.8     | 0      | 2.8     | 0.03  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
|                |   | 15 | 1925.9  | 2.8     | 0      | 2.8     | 0.03  | 37.40 | 0.67 | 1.10 | 1.00 | 0%  |
| Jambe de force |   |    |         |         |        |         |       |       |      |      |      |     |
| 16/17          | C | 16 | 2866.8  | -581.0  | 0      | -581.0  | 9.29  | 37.40 | 0.67 | 1.10 | 1.00 | 25% |
|                |   | 17 | -2861.4 | 581.5   | -58426 | 581.5   | 9.30  | 37.40 | 0.67 | 1.10 | 1.00 | 25% |
| 17/3           | C | 17 | 2701.3  | 969.0   | 58426  | 969.0   | 15.49 | 37.40 | 0.67 | 1.10 | 1.00 | 41% |
|                |   | 3  | -2698.1 | -968.6  | 0      | -968.6  | 15.49 | 37.40 | 0.67 | 1.10 | 1.00 | 41% |
| 13/19          | C | 13 | 1311.5  | -1196.9 | 0      | -1196.9 | 19.14 | 37.40 | 0.67 | 1.10 | 1.00 | 51% |
|                |   | 19 | -1314.7 | 1197.2  | -72193 | 1197.2  | 19.15 | 37.40 | 0.67 | 1.10 | 1.00 | 51% |
| 19/18          | C | 19 | 1512.0  | 718.5   | 72193  | 718.5   | 11.49 | 37.40 | 0.67 | 1.10 | 1.00 | 31% |
|                |   | 18 | -1517.3 | -718.0  | 0      | -718.0  | 11.48 | 37.40 | 0.67 | 1.10 | 1.00 | 31% |

DÉPLACEMENT DES NOEUDS

Unités : Déplacements Horizontaux, Verticaux (cm) - Rotation (rad)

Cas ELS 1 : Permanente

| Noeuds | Déplacements instantanés |           |           | Kdef | Déplacements différés |           |
|--------|--------------------------|-----------|-----------|------|-----------------------|-----------|
|        | Horizontaux              | Verticaux | Rotation  |      | Horizontaux           | Verticaux |
| 1      | -0.39                    | 0.00      | 0.000000  | 0.60 | -0.62                 | 0.00      |
| 2      | -0.42                    | 0.03      | 0.000388  | 0.60 | -0.67                 | 0.05      |
| 3      | -0.42                    | 0.03      | -0.001714 | 0.60 | -0.67                 | 0.05      |
| 4      | -0.18                    | -0.27     | -0.004049 | 0.60 | -0.29                 | -0.44     |
| 5      | -0.02                    | -0.49     | -0.002063 | 0.60 | -0.03                 | -0.79     |
| 6      | 0.01                     | -0.54     | 0.000018  | 0.60 | 0.02                  | -0.86     |
| 7      | -0.01                    | -0.51     | 0.000309  | 0.60 | -0.02                 | -0.82     |
| 8      | 0.00                     | -0.52     | 0.000000  | 0.60 | 0.00                  | -0.84     |
| 9      | -0.02                    | -0.54     | -0.000442 | 0.60 | -0.03                 | -0.87     |
| 10     | -0.03                    | -0.56     | -0.000340 | 0.60 | -0.06                 | -0.90     |
| 11     | -0.01                    | -0.52     | 0.002180  | 0.60 | -0.01                 | -0.83     |
| 12     | 0.09                     | -0.40     | 0.003806  | 0.60 | 0.14                  | -0.63     |
| 13     | 0.42                     | 0.03      | 0.001715  | 0.60 | 0.66                  | 0.05      |
| 14     | 0.42                     | 0.04      | 0.000213  | 0.60 | 0.67                  | 0.07      |
| 15     | 0.38                     | 0.00      | 0.000000  | 0.60 | 0.62                  | 0.00      |
| 16     | 0.00                     | 0.00      | 0.000000  | 0.60 | 0.00                  | 0.00      |
| 17     | -0.39                    | 0.03      | 0.001996  | 0.60 | -0.62                 | 0.05      |
| 18     | 0.00                     | 0.00      | 0.000000  | 0.60 | 0.00                  | 0.00      |
| 19     | 0.38                     | 0.03      | -0.001974 | 0.60 | 0.61                  | 0.05      |
| 20     | -0.01                    | -0.52     | -0.000073 | 0.60 | -0.02                 | -0.84     |

Cas ELS 2 : Permanente + Neige

| Noeuds | Déplacements instantanés |           |           | Kdef | Déplacements différés |           |
|--------|--------------------------|-----------|-----------|------|-----------------------|-----------|
|        | Horizontaux              | Verticaux | Rotation  |      | Horizontaux           | Verticaux |
| 1      | -1.23                    | 0.00      | 0.000000  | 0.60 | -1.46                 | 0.00      |
| 2      | -1.32                    | 0.11      | 0.001218  | 0.60 | -1.57                 | 0.13      |
| 3      | -1.32                    | 0.10      | -0.005510 | 0.60 | -1.57                 | 0.12      |
| 4      | -0.58                    | -0.87     | -0.012926 | 0.60 | -0.69                 | -1.03     |
| 5      | -0.04                    | -1.57     | -0.006610 | 0.60 | -0.05                 | -1.87     |
| 6      | 0.06                     | -1.71     | 0.000001  | 0.60 | 0.07                  | -2.03     |
| 7      | -0.01                    | -1.64     | 0.000876  | 0.60 | -0.02                 | -1.94     |
| 8      | 0.00                     | -1.65     | 0.000000  | 0.60 | 0.00                  | -1.97     |
| 9      | -0.04                    | -1.69     | -0.001114 | 0.60 | -0.05                 | -2.02     |
| 10     | -0.08                    | -1.74     | -0.000977 | 0.60 | -0.10                 | -2.08     |
| 11     | -0.01                    | -1.62     | 0.006819  | 0.60 | -0.01                 | -1.93     |
| 12     | 0.29                     | -1.24     | 0.011835  | 0.60 | 0.34                  | -1.47     |
| 13     | 1.32                     | 0.10      | 0.005505  | 0.60 | 1.56                  | 0.12      |
| 14     | 1.34                     | 0.13      | 0.000691  | 0.60 | 1.59                  | 0.16      |
| 15     | 1.22                     | 0.00      | 0.000000  | 0.60 | 1.45                  | 0.00      |
| 16     | 0.00                     | 0.00      | 0.000000  | 0.60 | 0.00                  | 0.00      |
| 17     | -1.21                    | 0.10      | 0.006284  | 0.60 | -1.45                 | 0.12      |
| 18     | 0.00                     | 0.00      | 0.000000  | 0.60 | 0.00                  | 0.00      |
| 19     | 1.21                     | 0.10      | -0.006250 | 0.60 | 1.44                  | 0.12      |
| 20     | -0.02                    | -1.65     | -0.000131 | 0.60 | -0.03                 | -1.97     |

Cas ELS (Neige redistribuée 1) 2 : Permanente + Neige

| Noeuds | Déplacements instantanés |           |           | Kdef | Déplacements différés |           |
|--------|--------------------------|-----------|-----------|------|-----------------------|-----------|
|        | Horizontaux              | Verticaux | Rotation  |      | Horizontaux           | Verticaux |
| 1      | -1.14                    | 0.00      | 0.000000  | 0.60 | -1.37                 | 0.00      |
| 2      | -1.22                    | 0.09      | 0.001346  | 0.60 | -1.47                 | 0.11      |
| 3      | -1.24                    | 0.11      | -0.003401 | 0.60 | -1.49                 | 0.13      |
| 4      | -0.74                    | -0.54     | -0.008815 | 0.60 | -0.85                 | -0.71     |
| 5      | -0.37                    | -1.03     | -0.004637 | 0.60 | -0.38                 | -1.32     |
| 6      | -0.29                    | -1.14     | -0.000634 | 0.60 | -0.29                 | -1.46     |
| 7      | -0.31                    | -1.12     | -0.000999 | 0.60 | -0.32                 | -1.43     |
| 8      | -0.12                    | -1.37     | 0.000000  | 0.60 | -0.12                 | -1.69     |
| 9      | -0.34                    | -1.64     | -0.002675 | 0.60 | -0.35                 | -1.97     |
| 10     | -0.40                    | -1.72     | -0.002002 | 0.60 | -0.42                 | -2.05     |



|    |       |       |           |      |       |       |
|----|-------|-------|-----------|------|-------|-------|
| 11 | -0.34 | -1.62 | 0.006518  | 0.60 | -0.35 | -1.93 |
| 12 | -0.06 | -1.25 | 0.011484  | 0.60 | -0.01 | -1.49 |
| 13 | 0.96  | 0.06  | 0.005723  | 0.60 | 1.21  | 0.08  |
| 14 | 0.99  | 0.10  | 0.001132  | 0.60 | 1.24  | 0.13  |
| 15 | 0.90  | 0.00  | 0.000000  | 0.60 | 1.13  | 0.00  |
| 16 | 0.00  | 0.00  | 0.000000  | 0.60 | 0.00  | 0.00  |
| 17 | -1.13 | 0.10  | 0.005931  | 0.60 | -1.36 | 0.12  |
| 18 | 0.00  | 0.00  | 0.000000  | 0.60 | 0.00  | 0.00  |
| 19 | 0.89  | 0.07  | -0.004491 | 0.60 | 1.12  | 0.09  |
| 20 | -0.35 | -1.37 | -0.001610 | 0.60 | -0.36 | -1.69 |

Cas ELS (Neige redistribuée 2) 2 : Permanente + Neige

| Noeuds | Déplacements instantanés |           |           | Kdef | Déplacements différés |           |
|--------|--------------------------|-----------|-----------|------|-----------------------|-----------|
|        | Horizontaux              | Verticaux | Rotation  |      | Horizontaux           | Verticaux |
| 1      | -0.90                    | 0.00      | 0.000000  | 0.60 | -1.13                 | 0.00      |
| 2      | -0.97                    | 0.09      | 0.000675  | 0.60 | -1.23                 | 0.11      |
| 3      | -0.96                    | 0.06      | -0.005721 | 0.60 | -1.21                 | 0.08      |
| 4      | -0.22                    | -0.89     | -0.012599 | 0.60 | -0.33                 | -1.06     |
| 5      | 0.30                     | -1.57     | -0.006310 | 0.60 | 0.29                  | -1.87     |
| 6      | 0.39                     | -1.70     | 0.000645  | 0.60 | 0.40                  | -2.02     |
| 7      | 0.29                     | -1.58     | 0.002467  | 0.60 | 0.29                  | -1.89     |
| 8      | 0.12                     | -1.37     | 0.000000  | 0.60 | 0.11                  | -1.68     |
| 9      | 0.27                     | -1.17     | 0.000783  | 0.60 | 0.25                  | -1.49     |
| 10     | 0.26                     | -1.18     | 0.000367  | 0.60 | 0.23                  | -1.51     |
| 11     | 0.33                     | -1.07     | 0.004800  | 0.60 | 0.32                  | -1.38     |
| 12     | 0.53                     | -0.80     | 0.008171  | 0.60 | 0.58                  | -1.04     |
| 13     | 1.22                     | 0.10      | 0.003392  | 0.60 | 1.47                  | 0.12      |
| 14     | 1.23                     | 0.12      | 0.000011  | 0.60 | 1.48                  | 0.14      |
| 15     | 1.12                     | 0.00      | 0.000000  | 0.60 | 1.36                  | 0.00      |
| 16     | 0.00                     | 0.00      | 0.000000  | 0.60 | 0.00                  | 0.00      |
| 17     | -0.89                    | 0.07      | 0.004492  | 0.60 | -1.12                 | 0.09      |
| 18     | 0.00                     | 0.00      | 0.000000  | 0.60 | 0.00                  | 0.00      |
| 19     | 1.11                     | 0.10      | -0.005872 | 0.60 | 1.34                  | 0.12      |
| 20     | 0.31                     | -1.37     | 0.001377  | 0.60 | 0.31                  | -1.68     |

EFFORTS, CONTRAINTES NORMALES ET TAUX DE TRAVAIL

Flambement(ATF: Anti-flambement(s) Plan et Perpendiculaire, EI: Elancement); Norm: effort normal; Moment Maxi et sa position  
 Unités : Moment (daN.cm) - Eff. Normal, Effort Tranchant (daN)

Cas ELU 1 : 1.35\*Permanente

| Barres         | Flambement |        |    |       |        | Moment Maxi |        |        | Moment Nul |      |       |      | Taux Travail |      |      |      |      |        |
|----------------|------------|--------|----|-------|--------|-------------|--------|--------|------------|------|-------|------|--------------|------|------|------|------|--------|
|                | ATF ⊥      | ATF // | EI | Kc, ⊥ | Kc, // | Norm        | Moment | Pos    | Tran1      | Pos1 | Tran2 | Pos2 |              | Kmod | Gm   | Ke   | Kh   |        |
| Arbalétrier    |            |        |    |       |        |             |        |        |            |      |       |      |              |      |      |      |      |        |
| 1/2            | C          | 1      | -  | 126 ⊥ | 0.19   | 1.00        | 685    | 11863  | 100%       |      |       | -262 | 0%           | 0.60 | 1.30 | 1.00 | 1.00 | 62%    |
| 2/3            | C          | 1      | -  | 126 ⊥ | 0.19   | 1.00        | 557    | 33997  | 100%       |      |       |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 113% * |
| 3/4            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.94        | 769    | 33997  | 0%         | 415  | 83%   |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 123% * |
| 4/5            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.94        | 579    | -21255 | 100%       |      |       |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 81%    |
| 5/6            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.98        | 942    | -21255 | 0%         |      |       |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 98%    |
| 6/7            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.98        | 760    | -12354 | 0%         |      |       | -358 | 68%          | 0.60 | 1.30 | 1.00 | 1.00 | 66%    |
| 7/8            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.99        | 216    | 5927   | 0%         | 49   | 100%  |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 25%    |
| 8/9            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.99        | 194    | 2831   | 100%       |      |       | -22  | 0%           | 0.60 | 1.30 | 1.00 | 1.00 | 16%    |
| 9/10           | C          | 1      | -  | 126 ⊥ | 0.19   | 0.98        | 737    | -7244  | 100%       | 386  | 28%   |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 52%    |
| 10/11          | C          | 1      | -  | 126 ⊥ | 0.19   | 0.98        | 914    | -22704 | 100%       |      |       |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 100% * |
| 11/12          | C          | 1      | -  | 126 ⊥ | 0.19   | 0.94        | 551    | -22704 | 0%         |      |       |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 84%    |
| 12/13          | C          | 1      | -  | 126 ⊥ | 0.19   | 0.94        | 744    | 34201  | 100%       |      |       | -383 | 32%          | 0.60 | 1.30 | 1.00 | 1.00 | 122% * |
| 13/14          | C          | 1      | -  | 126 ⊥ | 0.19   | 1.00        | 511    | 34201  | 0%         |      |       |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 111% * |
| 14/15          | C          | 1      | -  | 126 ⊥ | 0.19   | 1.00        | 652    | 19038  | 0%         |      |       |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 79%    |
| Entrait        |            |        |    |       |        |             |        |        |            |      |       |      |              |      |      |      |      |        |
| 5/20           | T          | -      | -  | 106 ⊥ |        |             | -473   | -801   | 66%        | 13   | 0%    |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 6%     |
| 20/11          | T          | -      | -  | 106 ⊥ |        |             | -473   | -801   | 33%        |      |       | -13  | 100%         | 0.60 | 1.30 | 1.00 | 1.00 | 6%     |
| 7/9            | C          | -      | -  | 51 ⊥  | 0.77   | 0.91        | 682    | -423   | 50%        | 10   | 0%    | -10  | 100%         | 0.60 | 1.30 | 1.00 | 1.00 | 6%     |
| Poinçon        |            |        |    |       |        |             |        |        |            |      |       |      |              |      |      |      |      |        |
| 20/8           | T          | -      | -  | 72 ⊥  |        |             | -24    | 0      | 100%       | 0    | 0%    | 0    | 100%         | 0.60 | 1.30 | 1.00 | 1.00 | 0%     |
| Blochet        |            |        |    |       |        |             |        |        |            |      |       |      |              |      |      |      |      |        |
| 1/17           | T          | -      | -  | 20 ⊥  |        |             | -702   | -66    | 50%        | 4    | 0%    | -4   | 100%         | 0.60 | 1.30 | 1.00 | 1.00 | 7%     |
| 19/15          | T          | -      | -  | 20 ⊥  |        |             | -695   | -66    | 50%        | 4    | 0%    | -4   | 100%         | 0.60 | 1.30 | 1.00 | 1.00 | 7%     |
| Jambe de force |            |        |    |       |        |             |        |        |            |      |       |      |              |      |      |      |      |        |
| 16/17          | C          | -      | -  | 80 ⊥  | 0.43   | 1.00        | 836    | 26280  | 100%       |      |       | -261 | 0%           | 0.60 | 1.30 | 1.00 | 1.00 | 84%    |
| 17/3           | C          | -      | -  | 80 ⊥  | 0.43   | 1.00        | 761    | 26280  | 0%         | 436  | 100%  |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 83%    |
| 13/19          | C          | -      | -  | 80 ⊥  | 0.43   | 1.00        | 788    | 26017  | 100%       |      |       | -431 | 0%           | 0.60 | 1.30 | 1.00 | 1.00 | 83%    |
| 19/18          | C          | -      | -  | 80 ⊥  | 0.43   | 1.00        | 862    | 26017  | 0%         |      |       |      |              | 0.60 | 1.30 | 1.00 | 1.00 | 84%    |

Cas ELU 2 : 1.35\*Permanente + 1.5\*Neige

| Barres         | Flambement |        |    |       |        | Moment Maxi |        |        | Moment Nul |      |       |       | Taux Travail |      |      |      |      |        |
|----------------|------------|--------|----|-------|--------|-------------|--------|--------|------------|------|-------|-------|--------------|------|------|------|------|--------|
|                | ATF ⊥      | ATF // | EI | Kc, ⊥ | Kc, // | Norm        | Moment | Pos    | Tran1      | Pos1 | Tran2 | Pos2  |              | Kmod | Gm   | Ke   | Kh   |        |
| Arbalétrier    |            |        |    |       |        |             |        |        |            |      |       |       |              |      |      |      |      |        |
| 1/2            | C          | 1      | -  | 126 ⊥ | 0.19   | 1.00        | 2227   | 43372  | 100%       |      |       | -904  | 0%           | 0.90 | 1.30 | 1.00 | 1.00 | 142% * |
| 2/3            | C          | 1      | -  | 126 ⊥ | 0.19   | 1.00        | 1884   | 115707 | 100%       |      |       |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 256% * |
| 3/4            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.94        | 2688   | 115707 | 0%         | 1286 | 85%   |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 280% * |
| 4/5            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.94        | 1967   | -74574 | 100%       |      |       |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 188% * |
| 5/6            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.98        | 3212   | -74574 | 0%         |      |       |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 226% * |
| 6/7            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.98        | 2723   | -38316 | 0%         |      |       | -1139 | 69%          | 0.90 | 1.30 | 1.00 | 1.00 | 148% * |
| 7/8            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.99        | 700    | 18640  | 0%         | 16   | 100%  |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 53%    |
| 8/9            | C          | 1      | -  | 126 ⊥ | 0.19   | 0.99        | 659    | 12765  | 100%       | 36   | 0%    | -36   | 24%          | 0.90 | 1.30 | 1.00 | 1.00 | 42%    |
| 9/10           | C          | 1      | -  | 126 ⊥ | 0.19   | 0.98        | 2630   | -18562 | 100%       | 1206 | 40%   |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 112% * |
| 10/11          | C          | 1      | -  | 126 ⊥ | 0.19   | 0.98        | 3158   | -77353 | 100%       |      |       |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 229% * |
| 11/12          | C          | 1      | -  | 126 ⊥ | 0.19   | 0.94        | 1913   | -77353 | 0%         |      |       |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 191% * |
| 12/13          | C          | 1      | -  | 126 ⊥ | 0.19   | 0.94        | 2641   | 116176 | 100%       |      |       | -1214 | 33%          | 0.90 | 1.30 | 1.00 | 1.00 | 280% * |
| 13/14          | C          | 1      | -  | 126 ⊥ | 0.19   | 1.00        | 1794   | 116176 | 0%         |      |       |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 254% * |
| 14/15          | C          | 1      | -  | 126 ⊥ | 0.19   | 1.00        | 2125   | 67888  | 0%         | 958  | 100%  |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 181% * |
| Entrait        |            |        |    |       |        |             |        |        |            |      |       |       |              |      |      |      |      |        |
| 5/20           | T          | -      | -  | 106 ⊥ |        |             | -1605  | -2946  | 100%       | 26   | 0%    |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 14%    |
| 20/11          | T          | -      | -  | 106 ⊥ |        |             | -1605  | -2946  | 0%         |      |       | -26   | 100%         | 0.90 | 1.30 | 1.00 | 1.00 | 14%    |
| 7/9            | C          | -      | -  | 51 ⊥  | 0.77   | 0.91        | 2431   | -423   | 50%        | 10   | 0%    | -10   | 100%         | 0.90 | 1.30 | 1.00 | 1.00 | 13%    |
| Poinçon        |            |        |    |       |        |             |        |        |            |      |       |       |              |      |      |      |      |        |
| 20/8           | C          | -      | -  | 72 ⊥  | 0.51   | 0.97        | 12     | 0      | 0%         | 0    | 0%    | 0     | 100%         | 0.90 | 1.30 | 1.00 | 1.00 | 0%     |
| Blochet        |            |        |    |       |        |             |        |        |            |      |       |       |              |      |      |      |      |        |
| 1/17           | T          | -      | -  | 20 ⊥  |        |             | -2383  | -66    | 50%        | 4    | 0%    | -4    | 100%         | 0.90 | 1.30 | 1.00 | 1.00 | 15%    |
| 19/15          | T          | -      | -  | 20 ⊥  |        |             | -2369  | -66    | 50%        | 4    | 0%    | -4    | 100%         | 0.90 | 1.30 | 1.00 | 1.00 | 15%    |
| Jambe de force |            |        |    |       |        |             |        |        |            |      |       |       |              |      |      |      |      |        |
| 16/17          | C          | -      | -  | 80 ⊥  | 0.43   | 1.00        | 2940   | 89335  | 100%       |      |       | -888  | 0%           | 0.90 | 1.30 | 1.00 | 1.00 | 193% * |
| 17/3           | C          | -      | -  | 80 ⊥  | 0.43   | 1.00        | 2696   | 89335  | 0%         | 1481 | 100%  |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 189% * |
| 13/19          | C          | -      | -  | 80 ⊥  | 0.43   | 1.00        | 2749   | 88811  | 100%       |      |       | -1472 | 0%           | 0.90 | 1.30 | 1.00 | 1.00 | 189% * |
| 19/18          | C          | -      | -  | 80 ⊥  | 0.43   | 1.00        | 2992   | 88811  | 0%         |      |       |       |              | 0.90 | 1.30 | 1.00 | 1.00 | 192% * |

Cas ELU (Neige redistribuée 1) 2 : 1.35\*Permanente + 1.5\*Neige

| Barres      | Flambement |        |    |       |        | Moment Maxi |        |       | Moment Nul |      |       |      | Taux Travail |      |      |      |      |        |
|-------------|------------|--------|----|-------|--------|-------------|--------|-------|------------|------|-------|------|--------------|------|------|------|------|--------|
|             | ATF ⊥      | ATF // | EI | Kc, ⊥ | Kc, // | Norm        | Moment | Pos   | Tran1      | Pos1 | Tran2 | Pos2 |              | Kmod | Gm   | Ke   | Kh   |        |
| Arbalétrier |            |        |    |       |        |             |        |       |            |      |       |      |              |      |      |      |      |        |
| 1/2         | C          | 1      | -  | 126 ⊥ | 0.19   | 1.00        | 2197   | 30164 | 100%       |      |       | -640 | 0%           | 0.90 | 1.30 | 1.00 | 1.00 | 118% * |

|                |   | Flambement |        |     | Moment Maxi |        |      | Moment Nul |        | Taux Travail |      |       |       |      |      |      |      |              |        |
|----------------|---|------------|--------|-----|-------------|--------|------|------------|--------|--------------|------|-------|-------|------|------|------|------|--------------|--------|
| Barres         |   | ATF ⊥      | ATF // | EI  | Kc, ⊥       | Kc, // | Norm | Moment     | Pos    | Tran1        | Pos1 | Tran2 | Pos2  | Kmod | Gm   | Ke   | Kh   | Taux Travail |        |
| Arbalétrier    |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 2/3            | C | 1          | -      | 126 | ⊥           | 0.19   | 1.00 | 1962       | 80342  | 100%         |      |       |       | 0.90 | 1.30 | 1.00 | 1.00 | 198% *       |        |
| 3/4            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 2031       | 80342  | 0%           | 889  | 87%   |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 200% * |
| 4/5            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 1575       | -49780 | 100%         |      |       |       | 0.90 | 1.30 | 1.00 | 1.00 | 133% *       |        |
| 5/6            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2606       | -49780 | 0%           |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 165% * |
| 6/7            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2216       | 27564  | 100%         |      |       | -870  | 39%  | 0.90 | 1.30 | 1.00 | 1.00         | 115% * |
| 7/8            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.99 | 635        | 27564  | 0%           | 168  | 100%  |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 67%    |
| 8/9            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.99 | 382        | -5224  | 55%          | 166  | 0%    |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 21%    |
| 9/10           | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2122       | -29730 | 100%         |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 115% * |
| 10/11          | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2651       | -75777 | 100%         |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 211% * |
| 11/12          | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 1620       | -75777 | 0%           |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 179% * |
| 12/13          | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 2348       | 110922 | 100%         |      |       | -1180 | 34%  | 0.90 | 1.30 | 1.00 | 1.00         | 262% * |
| 13/14          | C | 1          | -      | 126 | ⊥           | 0.19   | 1.00 | 1069       | 110922 | 0%           |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 223% * |
| 14/15          | C | 1          | -      | 126 | ⊥           | 0.19   | 1.00 | 1400       | 64367  | 0%           | 904  | 100%  |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 153% * |
| Entrait        |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 5/20           | T | -          | -      | 106 | ⊥           |        |      | -1330      | -2372  | 100%         | 23   | 0%    |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 11%    |
| 20/11          | T | -          | -      | 106 | ⊥           |        |      | -1330      | -2372  | 0%           |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 11%    |
| 7/9            | C | -          | -      | 51  | ⊥           | 0.77   | 0.91 | 2004       | -423   | 50%          | 10   | 0%    | -10   | 100% | 0.90 | 1.30 | 1.00 | 1.00         | 11%    |
| Poinçon        |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 20/8           | C | -          | -      | 72  | ⊥           | 0.51   | 0.97 | 6          | 0      | 0%           | 0    | 0%    | 0     | 100% | 0.90 | 1.30 | 1.00 | 1.00         | 0%     |
| Blochet        |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 1/17           | T | -          | -      | 20  | ⊥           |        |      | -2160      | -66    | 50%          | 4    | 0%    | -4    | 100% | 0.90 | 1.30 | 1.00 | 1.00         | 14%    |
| 19/15          | T | -          | -      | 20  | ⊥           |        |      | -1766      | -66    | 50%          | 4    | 0%    | -4    | 100% | 0.90 | 1.30 | 1.00 | 1.00         | 11%    |
| Jambe de force |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 16/17          | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 1716       | 80957  | 100%         |      |       | -805  | 0%   | 0.90 | 1.30 | 1.00 | 1.00         | 162% * |
| 17/3           | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 1494       | 80957  | 0%           |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 159% * |
| 13/19          | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 2983       | 66178  | 100%         |      |       | -1097 | 0%   | 0.90 | 1.30 | 1.00 | 1.00         | 153% * |
| 19/18          | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 3165       | 66178  | 0%           | 658  | 100%  |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 156% * |

Cas ELU (Neige redistribuée 2) 2 : 1.35\*Permanente + 1.5\*Neige

|                |   | Flambement |        |     | Moment Maxi |        |      | Moment Nul |        | Taux Travail |      |       |       |      |      |      |      |              |        |
|----------------|---|------------|--------|-----|-------------|--------|------|------------|--------|--------------|------|-------|-------|------|------|------|------|--------------|--------|
| Barres         |   | ATF ⊥      | ATF // | EI  | Kc, ⊥       | Kc, // | Norm | Moment     | Pos    | Tran1        | Pos1 | Tran2 | Pos2  | Kmod | Gm   | Ke   | Kh   | Taux Travail |        |
| Arbalétrier    |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 1/2            | C | 1          | -      | 126 | ⊥           | 0.19   | 1.00 | 1486       | 40825  | 100%         |      |       | -848  | 0%   | 0.90 | 1.30 | 1.00 | 1.00         | 115% * |
| 2/3            | C | 1          | -      | 126 | ⊥           | 0.19   | 1.00 | 1143       | 110216 | 100%         |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 224% * |
| 3/4            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 2386       | 110216 | 0%           | 1249 | 83%   |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 262% * |
| 4/5            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 1665       | -72708 | 100%         |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 176% * |
| 5/6            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2683       | -72708 | 0%           |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 206% * |
| 6/7            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2194       | -46364 | 0%           |      |       | -1031 | 94%  | 0.90 | 1.30 | 1.00 | 1.00         | 146% * |
| 7/8            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.99 | 522        | 3360   | 0%           | 120  | 20%   |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 22%    |
| 8/9            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.99 | 598        | 22467  | 100%         |      |       | -123  | 0%   | 0.90 | 1.30 | 1.00 | 1.00         | 57%    |
| 9/10           | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2163       | 22467  | 0%           | 911  | 93%   |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 104% * |
| 10/11          | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2544       | -51605 | 100%         |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 166% * |
| 11/12          | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 1525       | -51605 | 0%           |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 135% * |
| 12/13          | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 1986       | 80442  | 100%         |      |       | -834  | 31%  | 0.90 | 1.30 | 1.00 | 1.00         | 199% * |
| 13/14          | C | 1          | -      | 126 | ⊥           | 0.19   | 1.00 | 1878       | 80442  | 0%           |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 195% * |
| 14/15          | C | 1          | -      | 126 | ⊥           | 0.19   | 1.00 | 2114       | 46984  | 0%           |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 145% * |
| Entrait        |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 5/20           | T | -          | -      | 106 | ⊥           |        |      | -1313      | -2345  | 100%         | 23   | 0%    |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 11%    |
| 20/11          | T | -          | -      | 106 | ⊥           |        |      | -1313      | -2345  | 0%           |      |       | -23   | 100% | 0.90 | 1.30 | 1.00 | 1.00         | 11%    |
| 7/9            | C | -          | -      | 51  | ⊥           | 0.77   | 0.91 | 1983       | -423   | 50%          | 10   | 0%    | -10   | 100% | 0.90 | 1.30 | 1.00 | 1.00         | 10%    |
| Poinçon        |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 20/8           | C | -          | -      | 72  | ⊥           | 0.51   | 0.97 | 6          | 0      | 0%           | 0    | 0%    | 0     | 100% | 0.90 | 1.30 | 1.00 | 1.00         | 0%     |
| Blochet        |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 1/17           | T | -          | -      | 20  | ⊥           |        |      | -1766      | -66    | 50%          | 4    | 0%    | -4    | 100% | 0.90 | 1.30 | 1.00 | 1.00         | 11%    |
| 19/15          | T | -          | -      | 20  | ⊥           |        |      | -2136      | -66    | 50%          | 4    | 0%    | -4    | 100% | 0.90 | 1.30 | 1.00 | 1.00         | 13%    |
| Jambe de force |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 16/17          | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 3113       | 66186  | 100%         |      |       | -658  | 0%   | 0.90 | 1.30 | 1.00 | 1.00         | 155% * |
| 17/3           | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 2931       | 66186  | 0%           |      |       |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 153% * |
| 13/19          | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 1535       | 80046  | 100%         |      |       | -1327 | 0%   | 0.90 | 1.30 | 1.00 | 1.00         | 158% * |
| 19/18          | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 1754       | 80046  | 0%           | 796  | 100%  |       |      | 0.90 | 1.30 | 1.00 | 1.00         | 161% * |

Cas ELU (Neige Exceptionnelle) 2 (Accidentelle) : Permanente + Neige EXC.

|                |   | Flambement |        |     | Moment Maxi |        |      | Moment Nul |        | Taux Travail |      |       |       |      |      |      |      |              |        |
|----------------|---|------------|--------|-----|-------------|--------|------|------------|--------|--------------|------|-------|-------|------|------|------|------|--------------|--------|
| Barres         |   | ATF ⊥      | ATF // | EI  | Kc, ⊥       | Kc, // | Norm | Moment     | Pos    | Tran1        | Pos1 | Tran2 | Pos2  | Kmod | Gm   | Ke   | Kh   | Taux Travail |        |
| Arbalétrier    |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 1/2            | C | 1          | -      | 126 | ⊥           | 0.19   | 1.00 | 1996       | 40062  | 100%         |      |       | -823  | 0%   | 1.10 | 1.00 | 1.00 | 1.00         | 81%    |
| 2/3            | C | 1          | -      | 126 | ⊥           | 0.19   | 1.00 | 1707       | 104911 | 100%         |      |       |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 146% * |
| 3/4            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 2455       | 104911 | 0%           | 1132 | 85%   |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 160% * |
| 4/5            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 1786       | -68331 | 100%         |      |       |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 108% * |
| 5/6            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2921       | -68331 | 0%           |      |       |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 130% * |
| 6/7            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2513       | -33774 | 0%           |      |       | -1011 | 69%  | 1.10 | 1.00 | 1.00 | 1.00         | 85%    |
| 7/8            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.99 | 634        | 16477  | 0%           | 24   | 86%   |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 30%    |
| 8/9            | C | 1          | -      | 126 | ⊥           | 0.19   | 0.99 | 605        | 12337  | 100%         | 60   | 0%    | -60   | 36%  | 1.10 | 1.00 | 1.00 | 1.00         | 25%    |
| 9/10           | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2425       | -15280 | 100%         | 1062 | 44%   |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 63%    |
| 10/11          | C | 1          | -      | 126 | ⊥           | 0.19   | 0.98 | 2883       | -70280 | 100%         |      |       |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 131% * |
| 11/12          | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 1749       | -70280 | 0%           |      |       |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 109% * |
| 12/13          | C | 1          | -      | 126 | ⊥           | 0.19   | 0.94 | 2421       | 105260 | 100%         |      |       | -1079 | 33%  | 1.10 | 1.00 | 1.00 | 1.00         | 160% * |
| 13/14          | C | 1          | -      | 126 | ⊥           | 0.19   | 1.00 | 1644       | 105260 | 0%           |      |       |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 145% * |
| 14/15          | C | 1          | -      | 126 | ⊥           | 0.19   | 1.00 | 1906       | 62322  | 0%           | 861  | 100%  |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 104% * |
| Entrait        |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 5/20           | T | -          | -      | 106 | ⊥           |        |      | -1461      | -2732  | 100%         | 22   | 0%    |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 8%     |
| 20/11          | T | -          | -      | 106 | ⊥           |        |      | -1461      | -2732  | 0%           |      |       | -22   | 100% | 1.10 | 1.00 | 1.00 | 1.00         | 8%     |
| 7/9            | C | -          | -      | 51  | ⊥           | 0.77   | 0.91 | 2232       | -313   | 50%          | 7    | 0%    | -7    | 100% | 1.10 | 1.00 | 1.00 | 1.00         | 7%     |
| Poinçon        |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 20/8           | C | -          | -      | 72  | ⊥           | 0.51   | 0.97 | 15         | 0      | 0%           | 0    | 0%    | 0     | 100% | 1.10 | 1.00 | 1.00 | 1.00         | 0%     |
| Blochet        |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 1/17           | T | -          | -      | 20  | ⊥           |        |      | -2161      | -49    | 50%          | 3    | 0%    | -3    | 100% | 1.10 | 1.00 | 1.00 | 1.00         | 9%     |
| 19/15          | T | -          | -      | 20  | ⊥           |        |      | -2151      | -49    | 50%          | 3    | 0%    | -3    | 100% | 1.10 | 1.00 | 1.00 | 1.00         | 9%     |
| Jambe de force |   |            |        |     |             |        |      |            |        |              |      |       |       |      |      |      |      |              |        |
| 16/17          | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 2691       | 81014  | 100%         |      |       | -806  | 0%   | 1.10 | 1.00 | 1.00 | 1.00         | 110% * |
| 17/3           | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 2470       | 81014  | 0%           | 1343 | 100%  |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 108% * |
| 13/19          | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 2507       | 80640  | 100%         |      |       | -1337 | 0%   | 1.10 | 1.00 | 1.00 | 1.00         | 108% * |
| 19/18          | C | -          | -      | 80  | ⊥           | 0.43   | 1.00 | 2727       | 80640  | 0%           | 802  | 100%  |       |      | 1.10 | 1.00 | 1.00 | 1.00         | 110% * |

Cas ELU (Neige Exceptionnelle redistribuée 1) 2 (Accidentelle) : Permanente + Neige EXC.

|        |  | Flambement |        |    | Moment Maxi |        |      | Moment Nul |     | Taux Travail |      |       |      |      |    |
|--------|--|------------|--------|----|-------------|--------|------|------------|-----|--------------|------|-------|------|------|----|
| Barres |  | ATF ⊥      | ATF // | EI | Kc, ⊥       | Kc, // | Norm | Moment     | Pos | Tran1        | Pos1 | Tran2 | Pos2 | Kmod | Gm |

| Arbalétrier    |   |   |   |       |      |      |       |        |      |     |      |       |      |      |      |      |      |       |
|----------------|---|---|---|-------|------|------|-------|--------|------|-----|------|-------|------|------|------|------|------|-------|
| 7/8            | C | 1 | - | 126 ± | 0.19 | 0.99 | 566   | 25445  | 0%   | 139 | 100% |       |      | 1.10 | 1.00 | 1.00 | 1.00 | 38%   |
| 8/9            | C | 1 | - | 126 ± | 0.19 | 0.99 | 320   | -5986  | 55%  | 190 | 0%   |       |      | 1.10 | 1.00 | 1.00 | 1.00 | 13%   |
| 9/10           | C | 1 | - | 126 ± | 0.19 | 0.98 | 1925  | -26400 | 100% |     |      |       |      | 1.10 | 1.00 | 1.00 | 1.00 | 65%   |
| 10/11          | C | 1 | - | 126 ± | 0.19 | 0.98 | 2384  | -68721 | 100% |     |      |       |      | 1.10 | 1.00 | 1.00 | 1.00 | 120%* |
| 11/12          | C | 1 | - | 126 ± | 0.19 | 0.94 | 1461  | -68721 | 0%   |     |      |       |      | 1.10 | 1.00 | 1.00 | 1.00 | 102%* |
| 12/13          | C | 1 | - | 126 ± | 0.19 | 0.94 | 2134  | 100150 | 100% |     |      | -1047 | 34%  | 1.10 | 1.00 | 1.00 | 1.00 | 149%* |
| 13/14          | C | 1 | - | 126 ± | 0.19 | 1.00 | 931   | 100150 | 0%   |     |      |       |      | 1.10 | 1.00 | 1.00 | 1.00 | 126%* |
| 14/15          | C | 1 | - | 126 ± | 0.19 | 1.00 | 1193  | 58898  | 0%   | 808 | 100% |       |      | 1.10 | 1.00 | 1.00 | 1.00 | 87%   |
| Entrait        |   |   |   |       |      |      |       |        |      |     |      |       |      |      |      |      |      |       |
| 5/20           | T | - | - | 106 ± |      |      | -1189 | -2168  | 100% | 19  | 0%   |       |      | 1.10 | 1.00 | 1.00 | 1.00 | 6%    |
| 20/11          | T | - | - | 106 ± |      |      | -1189 | -2168  | 0%   |     |      |       |      | 1.10 | 1.00 | 1.00 | 1.00 | 6%    |
| 7/9            | C | - | - | 51 ±  | 0.77 | 0.91 | 1807  | -313   | 50%  | 7   | 0%   | -7    | 100% | 1.10 | 1.00 | 1.00 | 1.00 | 6%    |
| Poinçon        |   |   |   |       |      |      |       |        |      |     |      |       |      |      |      |      |      |       |
| 20/8           | C | - | - | 72 ±  | 0.51 | 0.97 | 9     | 0      | 0%   | 0   | 0%   | 0     | 100% | 1.10 | 1.00 | 1.00 | 1.00 | 0%    |
| Blochet        |   |   |   |       |      |      |       |        |      |     |      |       |      |      |      |      |      |       |
| 1/17           | T | - | - | 20 ±  |      |      | -1943 | -49    | 50%  | 3   | 0%   | -3    | 100% | 1.10 | 1.00 | 1.00 | 1.00 | 8%    |
| 19/15          | T | - | - | 20 ±  |      |      | -1558 | -49    | 50%  | 3   | 0%   | -3    | 100% | 1.10 | 1.00 | 1.00 | 1.00 | 6%    |
| Jambe de force |   |   |   |       |      |      |       |        |      |     |      |       |      |      |      |      |      |       |
| 16/17          | C | - | - | 80 ±  | 0.43 | 1.00 | 1484  | 72828  | 100% |     |      | -724  | 0%   | 1.10 | 1.00 | 1.00 | 1.00 | 91%   |
| 17/3           | C | - | - | 80 ±  | 0.43 | 1.00 | 1285  | 72828  | 0%   |     |      |       |      | 1.10 | 1.00 | 1.00 | 1.00 | 90%   |
| 13/19          | C | - | - | 80 ±  | 0.43 | 1.00 | 2738  | 58404  | 100% |     |      | -968  | 0%   | 1.10 | 1.00 | 1.00 | 1.00 | 86%   |
| 19/18          | C | - | - | 80 ±  | 0.43 | 1.00 | 2898  | 58404  | 0%   | 581 | 100% |       |      | 1.10 | 1.00 | 1.00 | 1.00 | 87%   |

Cas ELU (Neige Exceptionnelle redistribuée 2) 2 (Accidentelle) : Permanente + Neige EXC.

| Barres         | Flambement |        |    |       |        | Moment Maxi |        |        | Moment Nul |      |       |       | Taux Travail |      |      |      |      |       |
|----------------|------------|--------|----|-------|--------|-------------|--------|--------|------------|------|-------|-------|--------------|------|------|------|------|-------|
|                | ATF ±      | ATF // | EI | Kc, ± | Kc, // | Norm        | Moment | Pos    | Tran1      | Pos1 | Tran2 | Pos2  |              | Kmod | Gm   | Ke   | Kh   |       |
| Arbalétrier    |            |        |    |       |        |             |        |        |            |      |       |       |              |      |      |      |      |       |
| 1/2            | C          | 1      | -  | 126 ± | 0.19   | 1.00        | 1272   | 37622  | 100%       |      |       | -768  | 0%           | 1.10 | 1.00 | 1.00 | 1.00 | 65%   |
| 2/3            | C          | 1      | -  | 126 ± | 0.19   | 1.00        | 984    | 99651  | 100%       |      |       |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 127%* |
| 3/4            | C          | 1      | -  | 126 ± | 0.19   | 0.94        | 2161   | 99651  | 0%         | 1098 | 83%   |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 149%* |
| 4/5            | C          | 1      | -  | 126 ± | 0.19   | 0.94        | 1493   | -66580 | 100%       |      |       |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 101%* |
| 5/6            | C          | 1      | -  | 126 ± | 0.19   | 0.98        | 2407   | -66580 | 0%         |      |       |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 118%* |
| 6/7            | C          | 1      | -  | 126 ± | 0.19   | 0.98        | 1999   | -41715 | 0%         |      |       | -916  | 97%          | 1.10 | 1.00 | 1.00 | 1.00 | 83%   |
| 7/8            | C          | 1      | -  | 126 ± | 0.19   | 0.99        | 316    | -4075  | 55%        | 157  | 8%    | -157  | 100%         | 1.10 | 1.00 | 1.00 | 1.00 | 11%   |
| 8/9            | C          | 1      | -  | 126 ± | 0.19   | 0.99        | 540    | 21821  | 100%       |      |       | -107  | 0%           | 1.10 | 1.00 | 1.00 | 1.00 | 34%   |
| 9/10           | C          | 1      | -  | 126 ± | 0.19   | 0.98        | 1954   | 21821  | 0%         |      |       |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 61%   |
| 10/11          | C          | 1      | -  | 126 ± | 0.19   | 0.98        | 2280   | -45108 | 100%       | 553  | 2%    |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 92%   |
| 11/12          | C          | 1      | -  | 126 ± | 0.19   | 0.94        | 1366   | -45108 | 0%         |      |       |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 75%   |
| 12/13          | C          | 1      | -  | 126 ± | 0.19   | 0.94        | 1774   | 70406  | 100%       |      |       | -714  | 31%          | 1.10 | 1.00 | 1.00 | 1.00 | 110%* |
| 13/14          | C          | 1      | -  | 126 ± | 0.19   | 1.00        | 1724   | 70406  | 0%         |      |       |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 109%* |
| 14/15          | C          | 1      | -  | 126 ± | 0.19   | 1.00        | 1908   | 41636  | 0%         | 591  | 100%  |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 81%   |
| Entrait        |            |        |    |       |        |             |        |        |            |      |       |       |              |      |      |      |      |       |
| 5/20           | T          | -      | -  | 106 ± |        |             | -1178  | -2150  | 100%       | 19   | 0%    |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 6%    |
| 20/11          | T          | -      | -  | 106 ± |        |             | -1178  | -2150  | 0%         |      |       | -19   | 100%         | 1.10 | 1.00 | 1.00 | 1.00 | 6%    |
| 7/9            | C          | -      | -  | 51 ±  | 0.77   | 0.91        | 1794   | -313   | 50%        | 7    | 0%    | -7    | 100%         | 1.10 | 1.00 | 1.00 | 1.00 | 6%    |
| Poinçon        |            |        |    |       |        |             |        |        |            |      |       |       |              |      |      |      |      |       |
| 20/8           | C          | -      | -  | 72 ±  | 0.51   | 0.97        | 9      | 0      | 0%         | 0    | 0%    | 0     | 100%         | 1.10 | 1.00 | 1.00 | 1.00 | 0%    |
| Blochet        |            |        |    |       |        |             |        |        |            |      |       |       |              |      |      |      |      |       |
| 1/17           | T          | -      | -  | 20 ±  |        |             | -1559  | -49    | 50%        | 3    | 0%    | -3    | 100%         | 1.10 | 1.00 | 1.00 | 1.00 | 6%    |
| 19/15          | T          | -      | -  | 20 ±  |        |             | -1926  | -49    | 50%        | 3    | 0%    | -3    | 100%         | 1.10 | 1.00 | 1.00 | 1.00 | 8%    |
| Jambe de force |            |        |    |       |        |             |        |        |            |      |       |       |              |      |      |      |      |       |
| 16/17          | C          | -      | -  | 80 ±  | 0.43   | 1.00        | 2861   | 58426  | 100%       |      |       | -581  | 0%           | 1.10 | 1.00 | 1.00 | 1.00 | 87%   |
| 17/3           | C          | -      | -  | 80 ±  | 0.43   | 1.00        | 2701   | 58426  | 0%         |      |       |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 86%   |
| 13/19          | C          | -      | -  | 80 ±  | 0.43   | 1.00        | 1315   | 72192  | 100%       |      |       | -1197 | 0%           | 1.10 | 1.00 | 1.00 | 1.00 | 89%   |
| 19/18          | C          | -      | -  | 80 ±  | 0.43   | 1.00        | 1512   | 72192  | 0%         |      |       |       |              | 1.10 | 1.00 | 1.00 | 1.00 | 91%   |

TAUX DE TRAVAIL : COMPRESSION + FLEXION (RISQUE DEVERSEMENT)

Unités : Moment (daN.cm) - Effort Normal (daN) - Contraintes réelles et limites (daN/cm²)

Hypothèses de calcul : Bois de section rectangulaire et lef = 0.9\*1+2h avec h hauteur de la poutre considérée et l longueur de flambement/déversement(haut et bas) perpendiculaire.

Cas ELU 1 : 1.35\*Permanente

| Barres         | Contrainte de Flexion                                   |            |        |      | Contrainte de Compression |            |        |      | Kmod | Gm   | kcrit | Kc, ± | ke   | kh   | Taux Travail |
|----------------|---|------------|--------|------|---------------------------|------------|--------|------|------|------|-------|-------|------|------|--------------|
|                | Moment  | Contrainte | Limite | Taux | Normal                    | Contrainte | Limite | Taux |      |      |       |       |      |      |              |
| Arbalétrier    |   |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| 1/2            | 11864   | 25.42      | 74.50  | 34%  | 684.6                     | 4.89       | 15.71  | 31%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 43%          |
| 2/3            | 33997   | 72.85      | 74.50  | 98%  | 557.0                     | 3.98       | 15.71  | 25%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 121%*        |
| 3/4            | 33997   | 72.85      | 74.50  | 98%  | 769.4                     | 5.50       | 15.71  | 35%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 131%*        |
| 4/5            | -21255  | 45.55      | 74.50  | 61%  | 578.7                     | 4.13       | 15.71  | 26%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 64%          |
| 5/6            | -21255  | 45.55      | 74.50  | 61%  | 941.9                     | 6.73       | 15.71  | 43%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 80%          |
| 6/7            | -12354  | 26.47      | 74.50  | 36%  | 760.1                     | 5.43       | 15.71  | 35%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 47%          |
| 7/8            | 5928  | 12.70      | 74.50  | 17%  | 215.7                     | 1.54       | 15.71  | 10%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 17%          |
| 8/9            | 2832  | 6.07       | 74.50  | 8%   | 194.1                     | 1.39       | 15.71  | 9%   | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 9%           |
| 9/10           | -7244   | 15.52      | 74.50  | 21%  | 737.4                     | 5.27       | 15.71  | 34%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 38%          |
| 10/11          | -22704  | 48.65      | 74.50  | 65%  | 914.5                     | 6.53       | 15.71  | 42%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 84%          |
| 11/12          | -22704  | 48.65      | 74.50  | 65%  | 551.2                     | 3.94       | 15.71  | 25%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 68%          |
| 12/13          | 34201   | 73.29      | 74.50  | 98%  | 744.5                     | 5.32       | 15.71  | 34%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 131%*        |
| 13/14          | 34201   | 73.29      | 74.50  | 98%  | 510.5                     | 3.65       | 15.71  | 23%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 120%*        |
| 14/15          | 19039   | 40.80      | 74.50  | 55%  | 652.2                     | 4.66       | 15.71  | 30%  | 0.60 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 60%          |
| Entrait        |   |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| 5/20           | * Zone de pièce non vérifiée au déversement (kcrit = 1) |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| 20/11          | * Zone de pièce non vérifiée au déversement (kcrit = 1) |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| 7/9            | * Zone de pièce non vérifiée au déversement (kcrit = 1) |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| Poinçon        |   |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| 20/8           | * Zone de pièce non vérifiée au déversement (kcrit = 1) |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| Blochet        |   |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| 1/17           | * Zone de pièce non vérifiée au déversement (kcrit = 1) |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| 19/15          | * Zone de pièce non vérifiée au déversement (kcrit = 1) |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| Jambe de force |   |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| 16/17          | * Zone de pièce non vérifiée au déversement (kcrit = 1) |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| 17/3           | * Zone de pièce non vérifiée au déversement (kcrit = 1) |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| 13/19          | * Zone de pièce non vérifiée au déversement (kcrit = 1) |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |
| 19/18          | * Zone de pièce non vérifiée au déversement (kcrit = 1) |            |        |      |                           |            |        |      |      |      |       |       |      |      |              |

Cas ELU 2 : 1.35\*Permanente + 1.5\*Neige

| Barres      | Contrainte de Flexion |            |        |       | Contrainte de Compression |            |        |      | Kmod | Gm   | kcrit | Kc, ± | ke   | kh   | Taux Travail |
|-------------|-----------------------|------------|--------|-------|---------------------------|------------|--------|------|------|------|-------|-------|------|------|--------------|
|             | Moment                | Contrainte | Limite | Taux  | Normal                    | Contrainte | Limite | Taux |      |      |       |       |      |      |              |
| Arbalétrier |                       |            |        |       |                           |            |        |      |      |      |       |       |      |      |              |
| 1/2         | 43372                 | 92.94      | 111.75 | 83%   | 2227.3                    | 15.91      | 23.56  | 68%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 137%*        |
| 2/3         | 115707                | 247.94     | 111.75 | 222%* | 1884.2                    | 13.46      | 23.56  | 57%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 549%*        |
| 3/4         | 115707                | 247.94     | 111.75 | 222%* | 2688.5                    | 19.20      | 23.56  | 82%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 574%*        |
| 4/5         | -74574                | 159.80     | 111.75 | 143%* | 1966.8                    | 14.05      | 23.56  | 60%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 264%*        |

|       |        |        |        |        |        |       |       |     |      |      |      |      |      |      |        |
|-------|--------|--------|--------|--------|--------|-------|-------|-----|------|------|------|------|------|------|--------|
| 5/6   | -74574 | 159.80 | 111.75 | 143% * | 3211.8 | 22.94 | 23.56 | 97% | 0.90 | 1.30 | 0.90 | 0.19 | 1.00 | 1.00 | 302% * |
| 6/7   | -38317 | 82.11  | 111.75 | 73%    | 2722.7 | 19.45 | 23.56 | 83% | 0.90 | 1.30 | 0.90 | 0.19 | 1.00 | 1.00 | 137% * |
| 7/8   | 18641  | 39.94  | 111.75 | 36%    | 699.7  | 5.00  | 23.56 | 21% | 0.90 | 1.30 | 0.90 | 0.19 | 1.00 | 1.00 | 36%    |
| 8/9   | 12766  | 27.36  | 111.75 | 24%    | 658.8  | 4.71  | 23.56 | 20% | 0.90 | 1.30 | 0.90 | 0.19 | 1.00 | 1.00 | 26%    |
| 9/10  | -18563 | 39.78  | 111.75 | 36%    | 2629.5 | 18.78 | 23.56 | 80% | 0.90 | 1.30 | 0.90 | 0.19 | 1.00 | 1.00 | 92%    |
| 10/11 | -77354 | 165.76 | 111.75 | 148% * | 3158.5 | 22.56 | 23.56 | 96% | 0.90 | 1.30 | 0.90 | 0.19 | 1.00 | 1.00 | 316% * |
| 11/12 | -77354 | 165.76 | 111.75 | 148% * | 1913.5 | 13.67 | 23.56 | 58% | 0.90 | 1.30 | 0.90 | 0.19 | 1.00 | 1.00 | 278% * |
| 12/13 | 116177 | 248.95 | 111.75 | 223% * | 2641.4 | 18.87 | 23.56 | 80% | 0.90 | 1.30 | 0.90 | 0.19 | 1.00 | 1.00 | 576% * |
| 13/14 | 116177 | 248.95 | 111.75 | 223% * | 1794.1 | 12.81 | 23.56 | 54% | 0.90 | 1.30 | 0.90 | 0.19 | 1.00 | 1.00 | 551% * |
| 14/15 | 67888  | 145.47 | 111.75 | 130% * | 2125.4 | 15.18 | 23.56 | 64% | 0.90 | 1.30 | 0.90 | 0.19 | 1.00 | 1.00 | 234% * |

Entrait  
 5/20 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 20/11 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 7/9 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 Poinçon  
 20/8 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 Blochet  
 1/17 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 19/15 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 Jambe de force  
 16/17 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 17/3 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 13/19 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 19/18 \* Zone de pièce non vérifiée au déversement (kcrit = 1)

**Cas ELU (Neige redistribuée 1) 2 : 1.35\*Permanente + 1.5\*Neige**

| Barres      | Contrainte de Flexion |            |        |        | Contrainte de Compression |            |        |      | Kmod | Gm   | kcrit | Kc, ⊥ | ke   | kh   | Taux Travail |
|-------------|-----------------------|------------|--------|--------|---------------------------|------------|--------|------|------|------|-------|-------|------|------|--------------|
|             | Moment                | Contrainte | Limite | Taux   | Normal                    | Contrainte | Limite | Taux |      |      |       |       |      |      |              |
| Arbalétrier |                       |            |        |        |                           |            |        |      |      |      |       |       |      |      |              |
| 1/2         | 30165                 | 64.64      | 111.75 | 58%    | 2197.0                    | 15.69      | 23.56  | 67%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 100% *       |
| 2/3         | 80342                 | 172.16     | 111.75 | 154% * | 1961.6                    | 14.01      | 23.56  | 59%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 297% *       |
| 3/4         | 80342                 | 172.16     | 111.75 | 154% * | 2031.0                    | 14.51      | 23.56  | 62%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 299% *       |
| 4/5         | -49781                | 106.67     | 111.75 | 95%    | 1574.7                    | 11.25      | 23.56  | 48%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 139% *       |
| 5/6         | -49781                | 106.67     | 111.75 | 95%    | 2605.8                    | 18.61      | 23.56  | 79%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 170% *       |
| 6/7         | 27565                 | 59.07      | 111.75 | 53%    | 2215.9                    | 15.83      | 23.56  | 67%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 95%          |
| 7/8         | 27565                 | 59.07      | 111.75 | 53%    | 634.9                     | 4.54       | 23.56  | 19%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 53%          |
| 8/9         | -1903                 | 4.08       | 111.75 | 4%     | 487.1                     | 3.48       | 23.56  | 15%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 15%          |
| 9/10        | -29730                | 63.71      | 111.75 | 57%    | 2122.5                    | 15.16      | 23.56  | 64%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 97%          |
| 10/11       | -75778                | 162.38     | 111.75 | 145% * | 2651.4                    | 18.94      | 23.56  | 80%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 292% *       |
| 11/12       | -75778                | 162.38     | 111.75 | 145% * | 1620.4                    | 11.57      | 23.56  | 49%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 260% *       |
| 12/13       | 110923                | 237.69     | 111.75 | 213% * | 2348.3                    | 16.77      | 23.56  | 71%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 524% *       |
| 13/14       | 110923                | 237.69     | 111.75 | 213% * | 1068.7                    | 7.63       | 23.56  | 32%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 485% *       |
| 14/15       | 64367                 | 137.93     | 111.75 | 123% * | 1400.0                    | 10.00      | 23.56  | 42%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 195% *       |

Entrait  
 5/20 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 20/11 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 7/9 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 Poinçon  
 20/8 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 Blochet  
 1/17 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 19/15 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 Jambe de force  
 16/17 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 17/3 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 13/19 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 19/18 \* Zone de pièce non vérifiée au déversement (kcrit = 1)

**Cas ELU (Neige Exceptionnelle 2) 2 : 1.35\*Permanente + 1.5\*Neige**

| Barres      | Contrainte de Flexion |            |        |        | Contrainte de Compression |            |        |      | Kmod | Gm   | kcrit | Kc, ⊥ | ke   | kh   | Taux Travail |
|-------------|-----------------------|------------|--------|--------|---------------------------|------------|--------|------|------|------|-------|-------|------|------|--------------|
|             | Moment                | Contrainte | Limite | Taux   | Normal                    | Contrainte | Limite | Taux |      |      |       |       |      |      |              |
| Arbalétrier |                       |            |        |        |                           |            |        |      |      |      |       |       |      |      |              |
| 1/2         | 40826                 | 87.48      | 111.75 | 78%    | 1486.3                    | 10.62      | 23.56  | 45%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 106% *       |
| 2/3         | 110217                | 236.18     | 111.75 | 211% * | 1143.1                    | 8.17       | 23.56  | 35%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 481% *       |
| 3/4         | 110217                | 236.18     | 111.75 | 211% * | 2386.5                    | 17.05      | 23.56  | 72%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 519% *       |
| 4/5         | -72708                | 155.80     | 111.75 | 139% * | 1664.8                    | 11.89      | 23.56  | 50%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 245% *       |
| 5/6         | -72708                | 155.80     | 111.75 | 139% * | 2682.8                    | 19.16      | 23.56  | 81%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 276% *       |
| 6/7         | -46365                | 99.35      | 111.75 | 89%    | 2193.7                    | 15.67      | 23.56  | 67%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 146% *       |
| 7/8         | 3360                  | 7.20       | 111.75 | 6%     | 522.5                     | 3.73       | 23.56  | 16%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 16%          |
| 8/9         | 22467                 | 48.14      | 111.75 | 43%    | 598.1                     | 4.27       | 23.56  | 18%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 43%          |
| 9/10        | 22467                 | 48.14      | 111.75 | 43%    | 2162.7                    | 15.45      | 23.56  | 66%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 84%          |
| 10/11       | -51605                | 110.58     | 111.75 | 99%    | 2543.5                    | 18.17      | 23.56  | 77%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 175% *       |
| 11/12       | -51605                | 110.58     | 111.75 | 99%    | 1525.5                    | 10.90      | 23.56  | 46%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 144% *       |
| 12/13       | 80443                 | 172.38     | 111.75 | 154% * | 1986.0                    | 14.19      | 23.56  | 60%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 298% *       |
| 13/14       | 80443                 | 172.38     | 111.75 | 154% * | 1877.7                    | 13.41      | 23.56  | 57%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 295% *       |
| 14/15       | 46984                 | 100.68     | 111.75 | 90%    | 2114.2                    | 15.10      | 23.56  | 64%  | 0.90 | 1.30 | 0.90  | 0.19  | 1.00 | 1.00 | 145% *       |

Entrait  
 5/20 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
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 Jambe de force  
 16/17 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 17/3 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 13/19 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 19/18 \* Zone de pièce non vérifiée au déversement (kcrit = 1)

**Cas ELU (Neige Exceptionnelle 2) (Accidentelle) : Permanente + Neige EXC.**

| Barres      | Contrainte de Flexion |            |        |        | Contrainte de Compression |            |        |      | Kmod | Gm   | kcrit | Kc, ⊥ | ke   | kh   | Taux Travail |
|-------------|-----------------------|------------|--------|--------|---------------------------|------------|--------|------|------|------|-------|-------|------|------|--------------|
|             | Moment                | Contrainte | Limite | Taux   | Normal                    | Contrainte | Limite | Taux |      |      |       |       |      |      |              |
| Arbalétrier |                       |            |        |        |                           |            |        |      |      |      |       |       |      |      |              |
| 1/2         | 40063                 | 85.85      | 177.56 | 48%    | 1996.2                    | 14.26      | 37.43  | 38%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 61%          |
| 2/3         | 104912                | 224.81     | 177.56 | 127% * | 1707.4                    | 12.20      | 37.43  | 33%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 193% *       |
| 3/4         | 104912                | 224.81     | 177.56 | 127% * | 2454.6                    | 17.53      | 37.43  | 47%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 207% *       |

|       |        |        |        |        |        |       |       |     |      |      |      |      |      |      |        |
|-------|--------|--------|--------|--------|--------|-------|-------|-----|------|------|------|------|------|------|--------|
| 4/5   | -68332 | 146.42 | 177.56 | 82%    | 1786.4 | 12.76 | 37.43 | 34% | 1.10 | 1.00 | 0.90 | 0.19 | 1.00 | 1.00 | 102% * |
| 5/6   | -68332 | 146.42 | 177.56 | 82%    | 2920.8 | 20.86 | 37.43 | 56% | 1.10 | 1.00 | 0.90 | 0.19 | 1.00 | 1.00 | 124% * |
| 6/7   | -33775 | 72.37  | 177.56 | 41%    | 2513.1 | 17.95 | 37.43 | 48% | 1.10 | 1.00 | 0.90 | 0.19 | 1.00 | 1.00 | 65%    |
| 7/8   | 16478  | 35.31  | 177.56 | 20%    | 633.6  | 4.53  | 37.43 | 12% | 1.10 | 1.00 | 0.90 | 0.19 | 1.00 | 1.00 | 20%    |
| 8/9   | 12337  | 26.44  | 177.56 | 15%    | 604.8  | 4.32  | 37.43 | 12% | 1.10 | 1.00 | 0.90 | 0.19 | 1.00 | 1.00 | 15%    |
| 9/10  | -15280 | 32.74  | 177.56 | 18%    | 2425.0 | 17.32 | 37.43 | 46% | 1.10 | 1.00 | 0.90 | 0.19 | 1.00 | 1.00 | 50%    |
| 10/11 | -70281 | 150.60 | 177.56 | 85%    | 2883.2 | 20.59 | 37.43 | 55% | 1.10 | 1.00 | 0.90 | 0.19 | 1.00 | 1.00 | 127% * |
| 11/12 | -70281 | 150.60 | 177.56 | 85%    | 1748.9 | 12.49 | 37.43 | 33% | 1.10 | 1.00 | 0.90 | 0.19 | 1.00 | 1.00 | 105% * |
| 12/13 | 105260 | 225.56 | 177.56 | 127% * | 2421.4 | 17.30 | 37.43 | 46% | 1.10 | 1.00 | 0.90 | 0.19 | 1.00 | 1.00 | 208% * |
| 13/14 | 105260 | 225.56 | 177.56 | 127% * | 1643.6 | 11.74 | 37.43 | 31% | 1.10 | 1.00 | 0.90 | 0.19 | 1.00 | 1.00 | 193% * |
| 14/15 | 62322  | 133.55 | 177.56 | 75%    | 1906.1 | 13.62 | 37.43 | 36% | 1.10 | 1.00 | 0.90 | 0.19 | 1.00 | 1.00 | 93%    |

Entrait  
 5/20 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
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 Jambe de force  
 16/17 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
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 13/19 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
 19/18 \* Zone de pièce non vérifiée au déversement (kcrit = 1)

**Cas ELU (Neige Exceptionnelle redistribuée 1) 2 (Accidentelle) : Permanente + Neige EXC.**

| Barres      | Contrainte de Flexion |            |        |        | Contrainte de Compression |            |        |      | Kmod | Gm   | kcrit | Kc, ⊥ | ke   | kh   | Taux Travail |
|-------------|-----------------------|------------|--------|--------|---------------------------|------------|--------|------|------|------|-------|-------|------|------|--------------|
|             | Moment                | Contrainte | Limite | Taux   | Normal                    | Contrainte | Limite | Taux |      |      |       |       |      |      |              |
| Arbalétrier |                       |            |        |        |                           |            |        |      |      |      |       |       |      |      |              |
| 1/2         | 26865                 | 57.57      | 177.56 | 32%    | 1975.5                    | 14.11      | 37.43  | 38%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 48%          |
| 2/3         | 70308                 | 150.66     | 177.56 | 85%    | 1783.9                    | 12.74      | 37.43  | 34%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 106% *       |
| 3/4         | 70308                 | 150.66     | 177.56 | 85%    | 1805.9                    | 12.90      | 37.43  | 34%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 106% *       |
| 4/5         | -43789                | 93.83      | 177.56 | 53%    | 1401.1                    | 10.01      | 37.43  | 27%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 55%          |
| 5/6         | -43789                | 93.83      | 177.56 | 53%    | 2323.5                    | 16.60      | 37.43  | 44%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 72%          |
| 6/7         | 25445                 | 54.53      | 177.56 | 31%    | 1990.9                    | 14.22      | 37.43  | 38%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 47%          |
| 7/8         | 25445                 | 54.53      | 177.56 | 31%    | 566.3                     | 4.04       | 37.43  | 11%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 31%          |
| 8/9         | -2267                 | 4.86       | 177.56 | 3%     | 438.9                     | 3.13       | 37.43  | 8%   | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 8%           |
| 9/10        | -26401                | 56.57      | 177.56 | 32%    | 1925.4                    | 13.75      | 37.43  | 37%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 47%          |
| 10/11       | -68721                | 147.26     | 177.56 | 83%    | 2383.6                    | 17.03      | 37.43  | 45%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 114% *       |
| 11/12       | -68721                | 147.26     | 177.56 | 83%    | 1461.2                    | 10.44      | 37.43  | 28%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 97%          |
| 12/13       | 100150                | 214.61     | 177.56 | 121% * | 2133.7                    | 15.24      | 37.43  | 41%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 187% *       |
| 13/14       | 100150                | 214.61     | 177.56 | 121% * | 930.5                     | 6.65       | 37.43  | 18%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 164% *       |
| 14/15       | 58898                 | 126.21     | 177.56 | 71%    | 1193.0                    | 8.52       | 37.43  | 23%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 73%          |

Entrait  
 5/20 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
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 Jambe de force  
 16/17 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
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 19/18 \* Zone de pièce non vérifiée au déversement (kcrit = 1)

**Cas ELU (Neige Exceptionnelle redistribuée 2) 2 (Accidentelle) : Permanente + Neige EXC.**

| Barres      | Contrainte de Flexion |            |        |        | Contrainte de Compression |            |        |      | Kmod | Gm   | kcrit | Kc, ⊥ | ke   | kh   | Taux Travail |
|-------------|-----------------------|------------|--------|--------|---------------------------|------------|--------|------|------|------|-------|-------|------|------|--------------|
|             | Moment                | Contrainte | Limite | Taux   | Normal                    | Contrainte | Limite | Taux |      |      |       |       |      |      |              |
| Arbalétrier |                       |            |        |        |                           |            |        |      |      |      |       |       |      |      |              |
| 1/2         | 37622                 | 80.62      | 177.56 | 45%    | 1272.4                    | 9.09       | 37.43  | 24%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 45%          |
| 2/3         | 99651                 | 213.54     | 177.56 | 120% * | 983.6                     | 7.03       | 37.43  | 19%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 163% *       |
| 3/4         | 99651                 | 213.54     | 177.56 | 120% * | 2160.9                    | 15.44      | 37.43  | 41%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 186% *       |
| 4/5         | -66580                | 142.67     | 177.56 | 80%    | 1492.8                    | 10.66      | 37.43  | 28%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 93%          |
| 5/6         | -66580                | 142.67     | 177.56 | 80%    | 2406.6                    | 17.19      | 37.43  | 46%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 110% *       |
| 6/7         | -41715                | 89.39      | 177.56 | 50%    | 1998.9                    | 14.28      | 37.43  | 38%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 63%          |
| 7/8         | 1467                  | 3.14       | 177.56 | 2%     | 464.1                     | 3.31       | 37.43  | 9%   | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 9%           |
| 8/9         | 21822                 | 46.76      | 177.56 | 26%    | 540.2                     | 3.86       | 37.43  | 10%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 26%          |
| 9/10        | 21822                 | 46.76      | 177.56 | 26%    | 1954.0                    | 13.96      | 37.43  | 37%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 44%          |
| 10/11       | -45108                | 96.66      | 177.56 | 54%    | 2280.0                    | 16.29      | 37.43  | 44%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 73%          |
| 11/12       | -45108                | 96.66      | 177.56 | 54%    | 1366.2                    | 9.76       | 37.43  | 26%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 56%          |
| 12/13       | 70407                 | 150.87     | 177.56 | 85%    | 1774.1                    | 12.67      | 37.43  | 34%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 106% *       |
| 13/14       | 70407                 | 150.87     | 177.56 | 85%    | 1724.0                    | 12.31      | 37.43  | 33%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 105% *       |
| 14/15       | 41637                 | 89.22      | 177.56 | 50%    | 1907.7                    | 13.63      | 37.43  | 36%  | 1.10 | 1.00 | 0.90  | 0.19  | 1.00 | 1.00 | 62%          |

Entrait  
 5/20 \* Zone de pièce non vérifiée au déversement (kcrit = 1)  
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