

# ROOF LOADS

## SIMPLE-SPAN JOIST: ALLOWABLE LOADS FOR PWI JOISTS (PLF)

| Joist Span (ft) | PWI 20 |      |       |      |         |      |       |      |       |      |       |      | PWI 30 |      |       |      |         |      |       |      |
|-----------------|--------|------|-------|------|---------|------|-------|------|-------|------|-------|------|--------|------|-------|------|---------|------|-------|------|
|                 | 9 1/2" |      |       |      | 11 7/8" |      |       |      | 14"   |      |       |      | 9 1/2" |      |       |      | 11 7/8" |      |       |      |
|                 | Live   |      | Total |      | Live    |      | Total |      | Live  |      | Total |      | Live   |      | Total |      | Live    |      | Total |      |
|                 | L/240  | 100% | 115%  | 125% | L/240   | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240  | 100% | 115%  | 125% | L/240   | 100% | 115%  | 125% |
| 6               | -      | 301  | 346   | 376  | -       | 301  | 346   | 376  | -     | 301  | 346   | 376  | -      | 311  | 357   | 388  | -       | 311  | 357   | 388  |
| 7               | -      | 258  | 297   | 322  | -       | 258  | 297   | 322  | -     | 258  | 297   | 322  | -      | 266  | 306   | 333  | -       | 266  | 306   | 333  |
| 8               | -      | 226  | 259   | 282  | -       | 226  | 259   | 282  | -     | 226  | 259   | 282  | -      | 233  | 268   | 291  | -       | 233  | 268   | 291  |
| 9               | -      | 201  | 231   | 251  | -       | 201  | 231   | 251  | -     | 201  | 231   | 251  | -      | 207  | 238   | 259  | -       | 207  | 238   | 259  |
| 10              | -      | 181  | 208   | 226  | -       | 181  | 208   | 226  | -     | 181  | 208   | 226  | -      | 186  | 214   | 233  | -       | 186  | 214   | 233  |
| 11              | -      | 164  | 189   | 205  | -       | 164  | 189   | 205  | -     | 164  | 189   | 205  | -      | 169  | 195   | 212  | -       | 169  | 195   | 212  |
| 12              | 164    | 138  | 159   | 173  | -       | 150  | 173   | 188  | -     | 150  | 173   | 188  | 180    | 155  | 179   | 194  | -       | 155  | 179   | 194  |
| 13              | 131    | 118  | 135   | 147  | -       | 139  | 160   | 174  | -     | 139  | 160   | 174  | 144    | 143  | 165   | 179  | -       | 143  | 165   | 179  |
| 14              | 106    | 101  | 117   | 127  | -       | 129  | 148   | 161  | -     | 129  | 148   | 161  | 117    | 130  | 149   | 156  | -       | 133  | 153   | 166  |
| 15              | 87     | 88   | 102   | 110  | -       | 115  | 132   | 143  | -     | 120  | 138   | 150  | 96     | 113  | 128   | 128  | -       | 124  | 143   | 155  |
| 16              | 72     | 78   | 89    | 96   | 123     | 101  | 116   | 126  | -     | 113  | 130   | 141  | 80     | 99   | 106   | 106  | 135     | 117  | 134   | 146  |
| 17              | 61     | 69   | 79    | 81   | 104     | 89   | 103   | 111  | -     | 106  | 122   | 133  | 67     | 88   | 89    | 89   | 114     | 110  | 126   | 137  |
| 18              | 51     | 61   | 68    | 68   | 88      | 80   | 91    | 99   | -     | 95   | 109   | 118  | 57     | 76   | 76    | 76   | 97      | 102  | 117   | 127  |
| 19              | 44     | 55   | 58    | 58   | 75      | 71   | 82    | 89   | -     | 85   | 98    | 106  | 48     | 65   | 65    | 65   | 83      | 91   | 105   | 110  |
| 20              |        |      |       |      | 65      | 64   | 74    | 81   | 95    | 77   | 88    | 96   |        |      |       |      | 71      | 82   | 95    | 95   |
| 21              |        |      |       |      | 56      | 58   | 67    | 73   | 82    | 70   | 80    | 87   |        |      |       |      | 62      | 75   | 83    | 83   |
| 22              |        |      |       |      | 49      | 53   | 61    | 66   | 72    | 63   | 73    | 79   |        |      |       |      | 54      | 68   | 72    | 72   |
| 23              |        |      |       |      | 43      | 49   | 56    | 58   | 63    | 58   | 67    | 73   |        |      |       |      | 48      | 62   | 64    | 64   |
| 24              |        |      |       |      |         |      |       |      | 56    | 53   | 61    | 67   |        |      |       |      |         |      |       |      |
| 25              |        |      |       |      |         |      |       |      | 50    | 49   | 56    | 61   |        |      |       |      |         |      |       |      |
| 26              |        |      |       |      |         |      |       |      | 44    | 45   | 52    | 57   |        |      |       |      |         |      |       |      |
| 27              |        |      |       |      |         |      |       |      | 40    | 42   | 48    | 53   |        |      |       |      |         |      |       |      |
| 28              |        |      |       |      |         |      |       |      | 36    | 39   | 45    | 47   |        |      |       |      |         |      |       |      |
| 29              |        |      |       |      |         |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |
| 30              |        |      |       |      |         |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |

### Notes:

- Table values apply to uniformly loaded roof joists.
- Span is measured to the center of each support.
- Roofs must be sloped at least 1/4" in 12" to assure drainage.
- Table values do not account for stiffness added by glued or nailed sheathing.
- Provide at least 1 3/4" of bearing length at end supports and 3 1/2" at intermediate supports.
- Provide lateral restraint at supports (e.g. blocking panels, rim board) and along the compression flange of each joist (e.g. roof sheathing, gypsum board ceiling).
- Use sizing software or consult a professional engineer to analyze conditions outside the scope of this table (e.g. different bearing lengths, concentrated loads) or for multiple span joists if the length of any span is less than half the length of an adjacent span.

## HOW TO USE ROOF LOAD TABLES

- Choose a joist spacing and convert the live and total design loads specified in pounds per square foot (psf) to joist loads in pounds per lineal foot (plf).  
Joist Spacing (ft) x Design Load (psf) = Joist Load (plf).

### JOIST LOAD (PSF)

| Joist Spacing |        | Design Load (psf) |    |    |     |     |     |     |     |     |  |
|---------------|--------|-------------------|----|----|-----|-----|-----|-----|-----|-----|--|
| (inches)      | (feet) | 20                | 30 | 40 | 50  | 60  | 70  | 80  | 90  | 100 |  |
| 12            | 1      | 20                | 30 | 40 | 50  | 60  | 70  | 80  | 90  | 100 |  |
| 16            | 1.33   | 27                | 40 | 53 | 67  | 80  | 93  | 106 | 120 | 133 |  |
| 19.2          | 1.6    | 32                | 48 | 64 | 80  | 96  | 112 | 128 | 144 | 160 |  |
| 24            | 2      | 40                | 60 | 80 | 100 | 120 | 140 | 160 | 180 | 200 |  |

- Check the local building code for deflection requirements. Building codes typically require L/180 for total load and L/240 for live load. The values in the Total columns are based on L/180.
- Choose a span. Use the horizontal span dimension from the building plans for roofs that slope up to 2" in 12". For roof slopes greater than 2" in 12", multiply the horizontal dimension by the appropriate factor from the table below.

| Slope  | 2 1/2 in 12 | 3 in 12 | 3 1/2 in 12 | 4 in 12 | 4 1/2 in 12 | 5 in 12 | 6 in 12 | 7 in 12 | 8 in 12 | 9 in 12 | 10 in 12 | 11 in 12 | 12 in 12 |
|--------|-------------|---------|-------------|---------|-------------|---------|---------|---------|---------|---------|----------|----------|----------|
| Factor | 1.01        | 1.02    | 1.03        | 1.04    | 1.05        | 1.07    | 1.10    | 1.14    | 1.19    | 1.23    | 1.28     | 1.34     | 1.39     |

- Choose a load duration category – 100% for heavy snow, 115% for snow and 125% for non-snow. When in doubt, consult the local building department.
- Scan across the Span row to find a joist size with sufficient Live and applicable Total load capacities. Both requirements must be satisfied. When no value is shown in a Live column, Total load governs.
- Sloping joists must be fastened to each support to resist a sliding force equal to:

$$\frac{0.5XWL}{\sqrt{X^2 + 144}} \text{ at end supports and } \frac{1.25XWL}{\sqrt{X^2 + 144}} \text{ at intermediate supports}$$

$$\text{where } X = \text{roof slope in 12, } L = \text{span (ft) and } W = S \left\{ LL + \frac{DL\sqrt{X^2 + 144}}{12} \right\}, \text{ where } S = \text{joist spacing (ft), } LL = \text{live load (psf) and } DL = \text{dead load (psf)}$$

- Web stiffeners are required at all supports for 22" and 24" joists. See *Web Stiffener Requirements* on page 81 for more details.

# ROOF LOADS

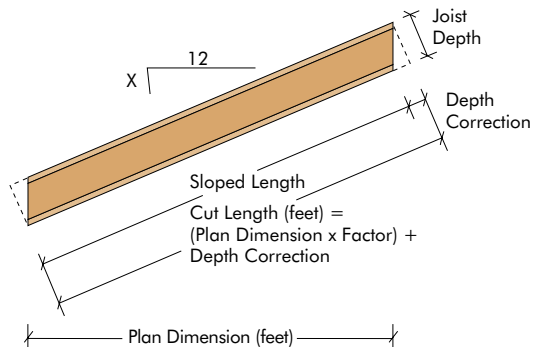
## SIMPLE-SPAN JOIST: ALLOWABLE LOADS FOR PWI JOISTS (PLF)

| Joist Span (ft) | PWI 40 |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | PWI 50 |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
|-----------------|--------|------|-------|------|---------|------|-------|------|-------|------|-------|------|-------|------|-------|------|--------|------|-------|------|---------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-----|
|                 | 9 1/2" |      |       |      | 11 7/8" |      |       |      | 14"   |      |       |      | 16"   |      |       |      | 9 1/2" |      |       |      | 11 7/8" |      |       |      | 14"   |      |       |      | 16"   |      |       |      |     |
|                 | Live   |      | Total |      | Live    |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live   |      | Total |      | Live    |      | Total |      | Live  |      | Total |      | Live  |      | Total |      |     |
|                 | L/240  | 100% | 115%  | 125% | L/240   | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240  | 100% | 115%  | 125% | L/240   | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% |     |
| 6               | -      | 355  | 408   | 444  | -       | 395  | 454   | 493  | -     | 395  | 454   | 493  | -     | 395  | 454   | 493  | -      | 334  | 384   | 417  | -       | 334  | 384   | 417  | -     | 334  | 384   | 417  | -     | 334  | 384   | 417  |     |
| 7               | -      | 304  | 350   | 380  | -       | 338  | 389   | 423  | -     | 338  | 389   | 423  | -     | 338  | 389   | 423  | -      | 286  | 329   | 358  | -       | 286  | 329   | 358  | -     | 286  | 329   | 358  | -     | 286  | 329   | 358  |     |
| 8               | -      | 266  | 306   | 333  | -       | 296  | 340   | 370  | -     | 296  | 340   | 370  | -     | 296  | 340   | 370  | -      | 250  | 288   | 313  | -       | 250  | 288   | 313  | -     | 250  | 288   | 313  | -     | 250  | 288   | 313  |     |
| 9               | -      | 237  | 272   | 296  | -       | 263  | 302   | 329  | -     | 263  | 302   | 329  | -     | 263  | 302   | 329  | -      | 222  | 256   | 278  | -       | 222  | 256   | 278  | -     | 222  | 256   | 278  | -     | 222  | 256   | 278  |     |
| 10              | -      | 213  | 245   | 266  | -       | 237  | 272   | 296  | -     | 237  | 272   | 296  | -     | 237  | 272   | 296  | -      | 200  | 230   | 250  | -       | 200  | 230   | 250  | -     | 200  | 230   | 250  | -     | 200  | 230   | 250  |     |
| 11              | -      | 178  | 205   | 223  | -       | 215  | 247   | 269  | -     | 215  | 247   | 269  | -     | 215  | 247   | 269  | -      | 182  | 209   | 228  | -       | 182  | 209   | 228  | -     | 182  | 209   | 228  | -     | 182  | 209   | 228  |     |
| 12              | -      | 150  | 172   | 187  | -       | 194  | 223   | 243  | -     | 197  | 227   | 247  | -     | 197  | 227   | 247  | -      | 205  | 167   | 192  | 209     | -    | 167   | 192  | 209   | -    | 167   | 192  | 209   | -    | 167   | 192  | 209 |
| 13              | -      | 128  | 147   | 160  | -       | 166  | 190   | 207  | -     | 182  | 209   | 228  | -     | 182  | 209   | 228  | -      | 164  | 154   | 177  | 193     | -    | 154   | 177  | 193   | -    | 154   | 177  | 193   | -    | 154   | 177  | 193 |
| 14              | -      | 110  | 127   | 138  | -       | 143  | 164   | 178  | -     | 169  | 194   | 211  | -     | 169  | 194   | 211  | -      | 133  | 143   | 164  | 178     | -    | 143   | 164  | 179   | -    | 143   | 164  | 179   | -    | 143   | 164  | 179 |
| 15              | 113    | 96   | 110   | 120  | -       | 124  | 143   | 155  | -     | 150  | 172   | 187  | -     | 158  | 181   | 197  | -      | 110  | 133   | 146  | 146     | -    | 133   | 154  | 167   | -    | 133   | 154  | 167   | -    | 133   | 154  | 167 |
| 16              | 94     | 84   | 97    | 105  | -       | 109  | 126   | 137  | -     | 132  | 151   | 165  | -     | 148  | 170   | 185  | -      | 91   | 117   | 122  | 122     | 154  | 125   | 144  | 156   | -    | 125   | 144  | 156   | -    | 125   | 144  | 156 |
| 17              | 79     | 75   | 86    | 93   | -       | 97   | 111   | 121  | -     | 117  | 134   | 146  | -     | 135  | 155   | 169  | -      | 77   | 102   | 102  | 102     | 130  | 118   | 135  | 147   | -    | 118   | 135  | 147   | -    | 118   | 135  | 147 |
| 18              | 67     | 67   | 77    | 83   | -       | 86   | 99    | 108  | -     | 104  | 120   | 130  | -     | 121  | 139   | 151  | -      | 65   | 87    | 87   | 87      | 110  | 111   | 128  | 139   | -    | 111   | 128  | 139   | -    | 111   | 128  | 139 |
| 19              | 58     | 60   | 69    | 75   | 97      | 77   | 89    | 97   | -     | 93   | 107   | 117  | -     | 108  | 124   | 135  | -      | 56   | 74    | 74   | 74      | 94   | 105   | 121  | 126   | -    | 105   | 121  | 132   | -    | 105   | 121  | 132 |
| 20              |        |      |       |      | 83      | 70   | 80    | 87   | -     | 84   | 97    | 105  | -     | 98   | 112   | 122  | -      |      |       |      |         | 82   | 97    | 109  | 109   | 120  | 100   | 115  | 125   | -    | 100   | 115  | 125 |
| 21              |        |      |       |      | 72      | 63   | 73    | 79   | -     | 76   | 88    | 96   | -     | 89   | 102   | 111  | -      |      |       |      |         | 71   | 88    | 94   | 94    | 104  | 95    | 110  | 119   | -    | 95    | 110  | 119 |
| 22              |        |      |       |      | 63      | 58   | 66    | 72   | -     | 70   | 80    | 87   | -     | 81   | 93    | 101  | -      |      |       |      |         | 62   | 80    | 83   | 83    | 91   | 91    | 105  | 114   | -    | 91    | 105  | 114 |
| 23              |        |      |       |      | 56      | 53   | 61    | 66   | -     | 64   | 73    | 80   | -     | 74   | 85    | 92   | -      |      |       |      |         | 54   | 73    | 73   | 73    | 80   | 87    | 100  | 107   | -    | 87    | 100  | 109 |
| 24              |        |      |       |      |         |      |       |      | 71    | 58   | 67    | 73   | -     | 68   | 78    | 85   | -      |      |       |      |         |      |       |      |       | 71   | 80    | 92   | 94    | 97   | 83    | 96   | 104 |
| 25              |        |      |       |      |         |      |       |      | 63    | 54   | 62    | 67   | -     | 62   | 72    | 78   | -      |      |       |      |         |      |       |      |       | 63   | 74    | 84   | 84    | 86   | 80    | 92   | 100 |
| 26              |        |      |       |      |         |      |       |      | 56    | 50   | 57    | 62   | -     | 58   | 66    | 72   | -      |      |       |      |         |      |       |      |       | 56   | 68    | 75   | 75    | 77   | 77    | 89   | 96  |
| 27              |        |      |       |      |         |      |       |      | 51    | 46   | 53    | 58   | -     | 54   | 62    | 67   | -      |      |       |      |         |      |       |      |       | 50   | 63    | 67   | 67    | 69   | 73    | 84   | 91  |
| 28              |        |      |       |      |         |      |       |      | 45    | 43   | 49    | 54   | -     | 50   | 57    | 62   | -      |      |       |      |         |      |       |      |       | 45   | 59    | 60   | 60    | 62   | 68    | 78   | 83  |
| 29              |        |      |       |      |         |      |       |      |       |      |       |      | 56    | 46   | 53    | 58   | -      |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 30              |        |      |       |      |         |      |       |      |       |      |       |      | 50    | 43   | 50    | 54   | -      |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 31              |        |      |       |      |         |      |       |      |       |      |       |      | 46    | 41   | 47    | 51   | -      |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 32              |        |      |       |      |         |      |       |      |       |      |       |      | 42    | 38   | 44    | 48   | -      |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 33              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 34              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 35              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 36              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 37              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 38              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 39              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 40              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 41              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 42              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 43              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 44              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 45              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 46              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 47              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |
| 48              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |     |

See notes on page 38

## UP-THE-SLOPE SPANS & CUTTING LENGTHS FOR SLOPED ROOFS

| Slope     | Factor | Joist Depth (inches)    |         |      |      |
|-----------|--------|-------------------------|---------|------|------|
|           |        | 9 1/2"                  | 11 7/8" | 14"  | 16"  |
|           |        | Depth Correction (feet) |         |      |      |
| 1 in 12   | 1.00   | 0.07                    | 0.08    | 0.10 | 0.11 |
| 2 in 12   | 1.01   | 0.13                    | 0.16    | 0.19 | 0.22 |
| 2.5 in 12 | 1.02   | 0.16                    | 0.21    | 0.24 | 0.28 |
| 3 in 12   | 1.03   | 0.20                    | 0.25    | 0.29 | 0.33 |
| 3.5 in 12 | 1.04   | 0.23                    | 0.29    | 0.34 | 0.39 |
| 4 in 12   | 1.05   | 0.26                    | 0.33    | 0.39 | 0.44 |
| 4.5 in 12 | 1.07   | 0.30                    | 0.37    | 0.44 | 0.50 |
| 5 in 12   | 1.08   | 0.33                    | 0.41    | 0.49 | 0.56 |
| 6 in 12   | 1.12   | 0.40                    | 0.49    | 0.58 | 0.67 |
| 7 in 12   | 1.16   | 0.46                    | 0.58    | 0.68 | 0.78 |
| 8 in 12   | 1.20   | 0.53                    | 0.66    | 0.78 | 0.89 |
| 9 in 12   | 1.25   | 0.59                    | 0.74    | 0.88 | 1.00 |
| 10 in 12  | 1.30   | 0.66                    | 0.82    | 0.97 | 1.11 |
| 11 in 12  | 1.36   | 0.73                    | 0.91    | 1.07 | 1.22 |
| 12 in 12  | 1.41   | 0.79                    | 0.99    | 1.17 | 1.33 |



# ROOF LOADS

## SIMPLE-SPAN JOIST: ALLOWABLE LOADS FOR PWI JOISTS (PLF)

| Joist Span (ft) | PWI 60 |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | PWI 70  |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
|-----------------|--------|------|-------|------|---------|------|-------|------|-------|------|-------|------|-------|------|-------|------|---------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-----|-----|-----|
|                 | 9 1/2" |      |       |      | 11 7/8" |      |       |      | 14"   |      |       |      | 16"   |      |       |      | 11 7/8" |      |       |      | 14"   |      |       |      | 16"   |      |       |      | 18"   |      |       |      | 20"   |      |       |      |     |     |     |
|                 | Live   |      | Total |      | Live    |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live    |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live  |      | Total |      |     |     |     |
|                 | L/240  | 100% | 115%  | 125% | L/240   | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240   | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% |     |     |     |
| 6               | -      | 355  | 408   | 444  | -       | 395  | 454   | 493  | -     | 395  | 454   | 493  | -     | 395  | 454   | 493  | -       | 381  | 439   | 477  | -     | 381  | 439   | 477  | -     | 381  | 439   | 477  | -     | 381  | 439   | 477  | -     | 381  | 439   | 477  |     |     |     |
| 7               | -      | 304  | 350   | 380  | -       | 338  | 389   | 423  | -     | 338  | 389   | 423  | -     | 338  | 389   | 423  | -       | 327  | 376   | 409  | -     | 327  | 376   | 409  | -     | 327  | 376   | 409  | -     | 327  | 376   | 409  | -     | 327  | 376   | 409  |     |     |     |
| 8               | -      | 266  | 306   | 333  | -       | 296  | 340   | 370  | -     | 296  | 340   | 370  | -     | 296  | 340   | 370  | -       | 286  | 329   | 358  | -     | 286  | 329   | 358  | -     | 286  | 329   | 358  | -     | 286  | 329   | 358  | -     | 286  | 329   | 358  |     |     |     |
| 9               | -      | 237  | 272   | 296  | -       | 263  | 302   | 329  | -     | 263  | 302   | 329  | -     | 263  | 302   | 329  | -       | 254  | 292   | 318  | -     | 254  | 292   | 318  | -     | 254  | 292   | 318  | -     | 254  | 292   | 318  | -     | 254  | 292   | 318  |     |     |     |
| 10              | -      | 213  | 245   | 266  | -       | 237  | 272   | 296  | -     | 237  | 272   | 296  | -     | 237  | 272   | 296  | -       | 229  | 263   | 286  | -     | 229  | 263   | 286  | -     | 229  | 263   | 286  | -     | 229  | 263   | 286  | -     | 229  | 263   | 286  |     |     |     |
| 11              | -      | 194  | 223   | 242  | -       | 215  | 247   | 269  | -     | 215  | 247   | 269  | -     | 215  | 247   | 269  | -       | 208  | 239   | 260  | -     | 208  | 239   | 260  | -     | 208  | 239   | 260  | -     | 208  | 239   | 260  | -     | 208  | 239   | 260  |     |     |     |
| 12              | -      | 178  | 204   | 222  | -       | 197  | 227   | 247  | -     | 197  | 227   | 247  | -     | 197  | 227   | 247  | -       | 191  | 219   | 238  | -     | 191  | 219   | 238  | -     | 191  | 219   | 238  | -     | 191  | 219   | 238  | -     | 191  | 219   | 238  |     |     |     |
| 13              | 199    | 164  | 188   | 205  | -       | 182  | 209   | 228  | -     | 182  | 209   | 228  | -     | 182  | 209   | 228  | -       | 176  | 202   | 220  | -     | 176  | 202   | 220  | -     | 176  | 202   | 220  | -     | 176  | 202   | 220  | -     | 176  | 202   | 220  |     |     |     |
| 14              | 162    | 152  | 175   | 190  | -       | 169  | 194   | 211  | -     | 169  | 194   | 211  | -     | 169  | 194   | 211  | -       | 163  | 188   | 204  | -     | 163  | 188   | 204  | -     | 163  | 188   | 204  | -     | 163  | 188   | 204  | -     | 163  | 188   | 204  |     |     |     |
| 15              | 134    | 133  | 152   | 166  | -       | 158  | 181   | 197  | -     | 158  | 181   | 197  | -     | 158  | 181   | 197  | -       | 153  | 175   | 191  | -     | 153  | 175   | 191  | -     | 153  | 175   | 191  | -     | 153  | 175   | 191  | -     | 153  | 175   | 191  |     |     |     |
| 16              | 111    | 117  | 134   | 146  | -       | 148  | 170   | 185  | -     | 148  | 170   | 185  | -     | 148  | 170   | 185  | -       | 143  | 164   | 179  | -     | 143  | 164   | 179  | -     | 143  | 164   | 179  | -     | 143  | 164   | 179  | -     | 143  | 164   | 179  |     |     |     |
| 17              | 94     | 103  | 119   | 125  | 156     | 134  | 154   | 167  | -     | 139  | 160   | 174  | -     | 139  | 160   | 174  | -       | 135  | 155   | 168  | -     | 135  | 155   | 168  | -     | 135  | 155   | 168  | -     | 135  | 155   | 168  | -     | 135  | 155   | 168  |     |     |     |
| 18              | 80     | 92   | 106   | 106  | 133     | 119  | 137   | 149  | -     | 132  | 151   | 164  | -     | 132  | 151   | 164  | -       | 146  | 127   | 146  | 159   | -    | 127   | 146  | 159   | -    | 127   | 146  | 159   | -    | 127   | 146  | 159   | -    | 127   | 146  | 159 |     |     |
| 19              | 68     | 83   | 91    | 91   | 114     | 107  | 123   | 134  | -     | 125  | 143   | 156  | -     | 125  | 143   | 156  | -       | 126  | 120   | 139  | 151   | -    | 120   | 139  | 151   | -    | 120   | 139  | 151   | -    | 120   | 139  | 151   | -    | 120   | 139  | 151 |     |     |
| 20              |        |      |       |      | 99      | 97   | 111   | 121  | 143   | 116  | 134   | 145  | -     | 118  | 136   | 148  | -       | 109  | 114   | 132  | 143   | -    | 114   | 132  | 143   | -    | 114   | 132  | 143   | -    | 114   | 132  | 143   | -    | 114   | 132  | 143 |     |     |
| 21              |        |      |       |      | 86      | 88   | 101   | 110  | 125   | 105  | 121   | 132  | -     | 113  | 130   | 141  | -       | 95   | 109   | 125  | 126   | -    | 109   | 125  | 136   | -    | 109   | 125  | 136   | -    | 109   | 125  | 136   | -    | 109   | 125  | 136 |     |     |
| 22              |        |      |       |      | 75      | 80   | 92    | 100  | 109   | 96   | 111   | 120  | -     | 108  | 124   | 135  | -       | 83   | 104   | 111  | 111   | -    | 120   | 104  | 120   | 130  | -     | 104  | 120   | 130  | -     | 104  | 120   | 130  | -     | 104  | 120 | 130 |     |
| 23              |        |      |       |      | 66      | 73   | 84    | 88   | 96    | 88   | 101   | 110  | -     | 102  | 117   | 127  | -       | 73   | 97    | 97   | 97    | -    | 105   | 99   | 114   | 124  | -     | 99   | 114   | 124  | -     | 99   | 114   | 124  | -     | 99   | 114 | 124 |     |
| 24              |        |      |       |      |         |      |       |      | 85    | 81   | 93    | 101  | 115   | 94   | 108   | 117  | -       |      |       |      |       | -    | 93    | 95   | 110   | 119  | -     | 95   | 110   | 119  | -     | 95   | 110   | 119  | -     | 95   | 110 | 119 |     |
| 25              |        |      |       |      |         |      |       |      | 76    | 74   | 86    | 93   | 102   | 86   | 99    | 108  | -       |      |       |      |       | -    | 83    | 92   | 105   | 111  | 111   | 92   | 105   | 114  | -     | 92   | 105   | 114  | -     | 92   | 105 | 114 |     |
| 26              |        |      |       |      |         |      |       |      | 68    | 69   | 79    | 86   | 92    | 80   | 92    | 100  | -       |      |       |      |       | -    | 74    | 88   | 99    | 99   | 99    | 88   | 101   | 110  | -     | 88   | 101   | 110  | -     | 88   | 101 | 110 |     |
| 27              |        |      |       |      |         |      |       |      | 61    | 64   | 73    | 80   | 82    | 74   | 85    | 92   | -       |      |       |      |       | -    | 67    | 85   | 89    | 89   | 89    | 85   | 97    | 106  | -     | 85   | 97    | 106  | -     | 85   | 97  | 106 |     |
| 28              |        |      |       |      |         |      |       |      | 55    | 59   | 68    | 73   | 74    | 69   | 79    | 86   | -       |      |       |      |       | -    | 60    | 80   | 80    | 80   | 80    | 80   | 82    | 94   | 102   | -    | 82    | 94   | 102   | -    | 82  | 94  | 102 |
| 29              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 30              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 31              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 32              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 33              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 34              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 35              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 36              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 37              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 38              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 39              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 40              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 41              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 42              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 43              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 44              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 45              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 46              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 47              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |
| 48              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | -       |      |       |      |       | -    |       |      |       |      |       |      |       |      |       |      |       |      |       |      |     |     |     |

See notes on page 38

# ROOF LOADS

## SIMPLE-SPAN JOIST: ALLOWABLE LOADS FOR PWI JOISTS (PLF)

| Joist Span (ft) | PWI 77 |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |    |
|-----------------|--------|------|-------|------|---------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|----|
|                 | 9 1/2" |      |       |      | 11 7/8" |      |       |      | 14"   |      |       |      | 16"   |      |       |      | 18"   |      |       |      | 20"   |      |       |      | 22"   |      |       |      | 24"   |      |       |      |    |
|                 | Live   |      | Total |      | Live    |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live  |      | Total |      |    |
|                 | L/240  | 100% | 115%  | 125% | L/240   | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% |    |
| 6               | -      | 423  | 486   | 528  | -       | 423  | 486   | 528  | -     | 423  | 486   | 528  | -     | 423  | 486   | 528  | -     | 423  | 486   | 528  | -     | 423  | 486   | 528  | -     | 786  | 904   | 982  | -     | 786  | 904   | 982  |    |
| 7               | -      | 362  | 416   | 453  | -       | 362  | 416   | 453  | -     | 362  | 416   | 453  | -     | 362  | 416   | 453  | -     | 362  | 416   | 453  | -     | 362  | 416   | 453  | -     | 674  | 775   | 842  | -     | 674  | 775   | 842  |    |
| 8               | -      | 317  | 364   | 396  | -       | 317  | 364   | 396  | -     | 317  | 364   | 396  | -     | 317  | 364   | 396  | -     | 317  | 364   | 396  | -     | 317  | 364   | 396  | -     | 589  | 678   | 737  | -     | 589  | 678   | 737  |    |
| 9               | -      | 282  | 324   | 352  | -       | 282  | 324   | 352  | -     | 282  | 324   | 352  | -     | 282  | 324   | 352  | -     | 282  | 324   | 352  | -     | 282  | 324   | 352  | -     | 524  | 602   | 655  | -     | 524  | 602   | 655  |    |
| 10              | -      | 254  | 292   | 317  | -       | 254  | 292   | 317  | -     | 254  | 292   | 317  | -     | 254  | 292   | 317  | -     | 254  | 292   | 317  | -     | 254  | 292   | 317  | -     | 471  | 542   | 589  | -     | 471  | 542   | 589  |    |
| 11              | -      | 230  | 265   | 288  | -       | 230  | 265   | 288  | -     | 230  | 265   | 288  | -     | 230  | 265   | 288  | -     | 230  | 265   | 288  | -     | 230  | 265   | 288  | -     | 429  | 493   | 536  | -     | 429  | 493   | 536  |    |
| 12              | -      | 211  | 243   | 264  | -       | 211  | 243   | 264  | -     | 211  | 243   | 264  | -     | 211  | 243   | 264  | -     | 211  | 243   | 264  | -     | 211  | 243   | 264  | -     | 393  | 452   | 491  | -     | 393  | 452   | 491  |    |
| 13              | 225    | 195  | 224   | 244  | -       | 195  | 224   | 244  | -     | 195  | 224   | 244  | -     | 195  | 224   | 244  | -     | 195  | 224   | 244  | -     | 195  | 224   | 244  | -     | 363  | 417   | 453  | -     | 363  | 417   | 453  |    |
| 14              | 183    | 181  | 208   | 226  | -       | 181  | 208   | 226  | -     | 181  | 208   | 226  | -     | 181  | 208   | 226  | -     | 181  | 208   | 226  | -     | 181  | 208   | 226  | -     | 337  | 387   | 421  | -     | 337  | 387   | 421  |    |
| 15              | 151    | 169  | 194   | 201  | -       | 169  | 194   | 211  | -     | 169  | 194   | 211  | -     | 169  | 194   | 211  | -     | 169  | 194   | 211  | -     | 169  | 194   | 211  | -     | 314  | 361   | 393  | -     | 314  | 361   | 393  |    |
| 16              | 126    | 158  | 168   | 168  | -       | 158  | 182   | 198  | -     | 158  | 182   | 198  | -     | 158  | 182   | 198  | -     | 158  | 182   | 198  | -     | 158  | 182   | 198  | -     | 295  | 339   | 368  | -     | 295  | 339   | 368  |    |
| 17              | 106    | 141  | 141   | 141  | 175     | 149  | 171   | 186  | -     | 149  | 171   | 186  | -     | 149  | 171   | 186  | -     | 149  | 171   | 186  | -     | 149  | 171   | 186  | -     | 277  | 319   | 347  | -     | 277  | 319   | 347  |    |
| 18              | 90     | 120  | 120   | 120  | 149     | 141  | 162   | 176  | -     | 141  | 162   | 176  | -     | 141  | 162   | 176  | -     | 141  | 162   | 176  | -     | 141  | 162   | 176  | -     | 262  | 301   | 327  | -     | 262  | 301   | 327  |    |
| 19              | 77     | 103  | 103   | 103  | 128     | 133  | 153   | 167  | -     | 133  | 153   | 167  | -     | 133  | 153   | 167  | -     | 133  | 153   | 167  | -     | 133  | 153   | 167  | -     | 248  | 285   | 310  | -     | 248  | 285   | 310  |    |
| 20              |        |      |       |      | 110     | 127  | 146   | 147  | -     | 127  | 146   | 158  | -     | 127  | 146   | 158  | -     | 127  | 146   | 158  | -     | 127  | 146   | 158  | -     | 227  | 262   | 295  | -     | 227  | 262   | 295  |    |
| 21              |        |      |       |      | 96      | 119  | 128   | 128  | 138   | 121  | 139   | 151  | -     | 121  | 139   | 151  | -     | 121  | 139   | 151  | -     | 121  | 139   | 151  | -     | 224  | 258   | 280  | -     | 225  | 258   | 281  |    |
| 22              |        |      |       |      | 84      | 109  | 112   | 112  | 121   | 115  | 133   | 144  | -     | 115  | 133   | 144  | -     | 115  | 133   | 144  | -     | 115  | 133   | 144  | -     | 204  | 235   | 255  | -     | 214  | 246   | 268  |    |
| 23              |        |      |       |      | 74      | 99   | 99    | 99   | 107   | 110  | 127   | 138  | -     | 110  | 127   | 138  | -     | 110  | 127   | 138  | -     | 110  | 127   | 138  | -     | 187  | 215   | 233  | -     | 187  | 215   | 233  |    |
| 24              |        |      |       |      |         |      |       |      | 95    | 106  | 121   | 126  | 127   | 106  | 121   | 132  | -     | 106  | 121   | 132  | -     | 106  | 121   | 132  | -     | 172  | 197   | 214  | -     | 203  | 234   | 254  |    |
| 25              |        |      |       |      |         |      |       |      | 84    | 101  | 112   | 112  | 113   | 101  | 117   | 127  | -     | 101  | 117   | 127  | -     | 101  | 117   | 127  | -     | 158  | 182   | 198  | -     | 172  | 198   | 215  |    |
| 26              |        |      |       |      |         |      |       |      | 75    | 93   | 100   | 100  | 101   | 98   | 112   | 122  | -     | 98   | 112   | 122  | -     | 98   | 112   | 122  | -     | 146  | 168   | 183  | -     | 159  | 183   | 199  |    |
| 27              |        |      |       |      |         |      |       |      | 67    | 86   | 90    | 90   | 91    | 94   | 108   | 117  | -     | 94   | 108   | 117  | -     | 94   | 108   | 117  | -     | 136  | 156   | 169  | -     | 148  | 170   | 184  |    |
| 28              |        |      |       |      |         |      |       |      | 61    | 80   | 81    | 81   | 82    | 91   | 104   | 109  | 106   | 91   | 104   | 113  | -     | 91   | 104   | 113  | -     | 126  | 145   | 158  | -     | 137  | 158   | 171  |    |
| 29              |        |      |       |      |         |      |       |      |       |      |       |      | 74    | 86   | 98    | 98   | 96    | 87   | 101   | 109  | -     | 87   | 101   | 109  | -     | 117  | 135   | 147  | -     | 128  | 147   | 160  |    |
| 30              |        |      |       |      |         |      |       |      |       |      |       |      | 67    | 80   | 89    | 89   | 87    | 85   | 97    | 106  | -     | 85   | 97    | 106  | 134   | 110  | 126   | 137  | -     | 120  | 137   | 149  |    |
| 31              |        |      |       |      |         |      |       |      |       |      |       |      | 61    | 75   | 81    | 81   | 79    | 82   | 94    | 102  | 99    | 82   | 94    | 102  | 122   | 103  | 118   | 129  | -     | 112  | 129   | 140  |    |
| 32              |        |      |       |      |         |      |       |      |       |      |       |      | 55    | 70   | 74    | 74   | 72    | 79   | 91    | 96   | 91    | 79   | 91    | 99   | 112   | 96   | 111   | 121  | -     | 105  | 121   | 131  |    |
| 33              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | 66    | 74   | 86    | 88   | 83    | 77   | 88    | 96   | 102   | 91   | 104   | 113  | -     | 99   | 114   | 123  |    |
| 34              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | 60    | 70   | 81    | 81   | 76    | 75   | 86    | 93   | 94    | 85   | 98    | 107  | 114   | 93   | 107   | 116  |    |
| 35              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | 56    | 66   | 74    | 74   | 70    | 72   | 83    | 91   | 86    | 81   | 93    | 101  | 105   | 88   | 101   | 110  |    |
| 36              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | 51    | 63   | 68    | 68   | 65    | 69   | 80    | 86   | 80    | 76   | 88    | 95   | 96    | 83   | 95    | 104  |    |
| 37              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | 60    | 66   | 76    | 80   | 74    | 72   | 83    | 90   | 89    | 79   | 90    | 98   |    |
| 38              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | 55    | 62   | 72    | 74   | 68    | 68   | 79    | 86   | 82    | 74   | 86    | 93   |    |
| 39              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | 51    | 59   | 68    | 68   | 63    | 65   | 75    | 81   | 76    | 71   | 81    | 88   |    |
| 40              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | 48    | 56   | 63    | 63   | 59    | 62   | 71    | 77   | 71    | 67   | 77    | 84   |    |
| 41              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       | 55   | 59    | 68   | 73    | 66   | 64    | 74   | 80 |
| 42              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       | 51   | 56    | 64   | 68    | 62   | 61    | 70   | 76 |
| 43              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       | 47   | 53    | 61   | 63    | 58   | 58    | 67   | 73 |
| 44              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       | 44   | 51    | 59   | 54    | 56   | 64    | 69   |    |
| 45              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |    |
| 46              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |    |
| 47              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |    |
| 48              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |    |

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# ROOF LOADS

## SIMPLE-SPAN JOIST: ALLOWABLE LOADS FOR PWI JOISTS (PLF)

| Joist Span (ft) | PWI 90 |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |
|-----------------|--------|------|-------|------|---------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|-------|------|
|                 | 9 1/2" |      |       |      | 11 7/8" |      |       |      | 14"   |      |       |      | 16"   |      |       |      | 18"   |      |       |      | 20"   |      |       |      | 22"   |      |       |      | 24"   |      |       |      |
|                 | Live   |      | Total |      | Live    |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live  |      | Total |      | Live  |      | Total |      |
|                 | L/240  | 100% | 115%  | 125% | L/240   | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% | L/240 | 100% | 115%  | 125% |
| 6               | -      | 460  | 529   | 575  | -       | 460  | 529   | 575  | -     | 460  | 529   | 575  | -     | 460  | 529   | 575  | -     | 460  | 529   | 575  | -     | 460  | 529   | 575  | -     | 789  | 907   | 986  | -     | 789  | 907   | 986  |
| 7               | -      | 395  | 454   | 493  | -       | 395  | 454   | 493  | -     | 395  | 454   | 493  | -     | 395  | 454   | 493  | -     | 395  | 454   | 493  | -     | 395  | 454   | 493  | -     | 676  | 778   | 845  | -     | 676  | 778   | 845  |
| 8               | -      | 345  | 397   | 432  | -       | 345  | 397   | 432  | -     | 345  | 397   | 432  | -     | 345  | 397   | 432  | -     | 345  | 397   | 432  | -     | 345  | 397   | 432  | -     | 592  | 681   | 740  | -     | 592  | 681   | 740  |
| 9               | -      | 307  | 353   | 384  | -       | 307  | 353   | 384  | -     | 307  | 353   | 384  | -     | 307  | 353   | 384  | -     | 307  | 353   | 384  | -     | 307  | 353   | 384  | -     | 526  | 605   | 658  | -     | 526  | 605   | 658  |
| 10              | -      | 276  | 318   | 345  | -       | 276  | 318   | 345  | -     | 276  | 318   | 345  | -     | 276  | 318   | 345  | -     | 276  | 318   | 345  | -     | 276  | 318   | 345  | -     | 473  | 544   | 592  | -     | 473  | 544   | 592  |
| 11              | -      | 251  | 289   | 314  | -       | 251  | 289   | 314  | -     | 251  | 289   | 314  | -     | 251  | 289   | 314  | -     | 251  | 289   | 314  | -     | 251  | 289   | 314  | -     | 430  | 495   | 538  | -     | 430  | 495   | 538  |
| 12              | -      | 230  | 265   | 288  | -       | 230  | 265   | 288  | -     | 230  | 265   | 288  | -     | 230  | 265   | 288  | -     | 230  | 265   | 288  | -     | 230  | 265   | 288  | -     | 395  | 454   | 493  | -     | 395  | 454   | 493  |
| 13              | -      | 212  | 244   | 266  | -       | 212  | 244   | 266  | -     | 212  | 244   | 266  | -     | 212  | 244   | 266  | -     | 212  | 244   | 266  | -     | 212  | 244   | 266  | -     | 364  | 419   | 455  | -     | 364  | 419   | 455  |
| 14              | -      | 197  | 227   | 247  | -       | 197  | 227   | 247  | -     | 197  | 227   | 247  | -     | 197  | 227   | 247  | -     | 197  | 227   | 247  | -     | 197  | 227   | 247  | -     | 338  | 389   | 423  | -     | 338  | 389   | 423  |
| 15              | 216    | 184  | 212   | 230  | -       | 184  | 212   | 230  | -     | 184  | 212   | 230  | -     | 184  | 212   | 230  | -     | 184  | 212   | 230  | -     | 184  | 212   | 230  | -     | 316  | 363   | 395  | -     | 316  | 363   | 395  |
| 16              | 181    | 173  | 199   | 216  | -       | 173  | 199   | 216  | -     | 173  | 199   | 216  | -     | 173  | 199   | 216  | -     | 173  | 199   | 216  | -     | 173  | 199   | 216  | -     | 295  | 340   | 370  | -     | 295  | 340   | 370  |
| 17              | 153    | 162  | 187   | 203  | -       | 162  | 187   | 203  | -     | 162  | 187   | 203  | -     | 162  | 187   | 203  | -     | 162  | 187   | 203  | -     | 162  | 187   | 203  | -     | 279  | 320   | 348  | -     | 279  | 320   | 348  |
| 18              | 131    | 153  | 174   | 192  | -       | 153  | 176   | 192  | -     | 153  | 176   | 192  | -     | 153  | 176   | 192  | -     | 153  | 176   | 192  | -     | 153  | 176   | 192  | -     | 263  | 302   | 329  | -     | 263  | 302   | 329  |
| 19              | 112    | 145  | 167   | 182  | -       | 145  | 167   | 182  | -     | 145  | 167   | 182  | -     | 145  | 167   | 182  | -     | 145  | 167   | 182  | -     | 145  | 167   | 182  | -     | 249  | 287   | 311  | -     | 249  | 287   | 311  |
| 20              |        |      |       |      | 159     | 138  | 159   | 173  | -     | 138  | 159   | 173  | -     | 138  | 159   | 173  | -     | 138  | 159   | 173  | -     | 138  | 159   | 173  | -     | 237  | 272   | 296  | -     | 237  | 272   | 296  |
| 21              |        |      |       |      | 139     | 132  | 151   | 164  | -     | 132  | 151   | 164  | -     | 132  | 151   | 164  | -     | 132  | 151   | 164  | -     | 132  | 151   | 164  | -     | 225  | 259   | 282  | -     | 225  | 259   | 282  |
| 22              |        |      |       |      | 122     | 126  | 144   | 157  | -     | 126  | 144   | 157  | -     | 126  | 144   | 157  | -     | 126  | 144   | 157  | -     | 126  | 144   | 157  | -     | 215  | 247   | 269  | -     | 215  | 247   | 269  |
| 23              |        |      |       |      | 107     | 120  | 138   | 143  | -     | 120  | 138   | 150  | -     | 120  | 138   | 150  | -     | 120  | 138   | 150  | -     | 120  | 138   | 150  | -     | 206  | 237   | 257  | -     | 206  | 237   | 257  |
| 24              |        |      |       |      |         |      |       |      | 136   | 115  | 132   | 144  | -     | 115  | 132   | 144  | -     | 115  | 132   | 144  | -     | 115  | 132   | 144  | -     | 197  | 227   | 247  | -     | 197  | 227   | 247  |
| 25              |        |      |       |      |         |      |       |      | 122   | 110  | 127   | 138  | -     | 110  | 127   | 138  | -     | 110  | 127   | 138  | -     | 110  | 127   | 138  | -     | 189  | 218   | 237  | -     | 189  | 218   | 237  |
| 26              |        |      |       |      |         |      |       |      | 109   | 106  | 122   | 133  | -     | 106  | 122   | 133  | -     | 106  | 122   | 133  | -     | 106  | 122   | 133  | -     | 182  | 209   | 228  | -     | 182  | 209   | 228  |
| 27              |        |      |       |      |         |      |       |      | 98    | 102  | 118   | 128  | -     | 102  | 118   | 128  | -     | 102  | 118   | 128  | -     | 102  | 118   | 128  | -     | 175  | 202   | 219  | -     | 175  | 202   | 219  |
| 28              |        |      |       |      |         |      |       |      | 88    | 99   | 113   | 118  | 118   | 99   | 113   | 123  | -     | 99   | 113   | 123  | -     | 99   | 113   | 123  | -     | 169  | 194   | 211  | -     | 169  | 194   | 211  |
| 29              |        |      |       |      |         |      |       |      |       |      |       |      | 107   | 95   | 110   | 119  | -     | 95   | 110   | 119  | -     | 95   | 110   | 119  | -     | 163  | 188   | 204  | -     | 163  | 188   | 204  |
| 30              |        |      |       |      |         |      |       |      |       |      |       |      | 97    | 92   | 106   | 115  | -     | 92   | 106   | 115  | -     | 92   | 106   | 115  | -     | 158  | 181   | 197  | -     | 158  | 181   | 197  |
| 31              |        |      |       |      |         |      |       |      |       |      |       |      | 88    | 89   | 102   | 111  | -     | 89   | 102   | 111  | -     | 89   | 102   | 111  | -     | 153  | 176   | 191  | -     | 153  | 176   | 191  |
| 32              |        |      |       |      |         |      |       |      |       |      |       |      | 80    | 86   | 99    | 107  | 104   | 86   | 99    | 108  | -     | 86   | 99    | 108  | -     | 148  | 170   | 185  | -     | 148  | 170   | 185  |
| 33              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | 95    | 84   | 96    | 105  | -     | 84   | 96    | 105  | -     | 139  | 160   | 174  | -     | 139  | 160   | 174  |
| 34              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | 87    | 81   | 93    | 102  | -     | 81   | 93    | 102  | -     | 134  | 151   | 164  | -     | 134  | 151   | 164  |
| 35              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | 80    | 79   | 91    | 99   | -     | 79   | 91    | 99   | -     | 124  | 143   | 155  | -     | 124  | 143   | 155  |
| 36              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      | 74    | 77   | 88    | 96   | 93    | 77   | 88    | 96   | 114   | 117  | 135   | 146  | -     | 117  | 135   | 146  |
| 37              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | 86    | 75   | 86    | 93   | 106   | 111  | 128   | 139  | -     | 128  | 139   | 151  |
| 38              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | 80    | 73   | 84    | 91   | 98    | 105  | 121   | 130  | -     | 130  | 138   | 143  |
| 39              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | 74    | 71   | 81    | 89   | 91    | 100  | 115   | 121  | -     | 121  | 129   | 136  |
| 40              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | 69    | 69   | 79    | 86   | 84    | 95   | 109   | 113  | -     | 113  | 120   | 129  |
| 41              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | -     | 104  | 111   | 123  |
| 42              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | -     | 90   | 98    | 110  |
| 43              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | -     | 82   | 91    | 103  |
| 44              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | -     | 78   | 85    | 98   |
| 45              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | -     | 72   | 82    | 97   |
| 46              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | -     | 68   | 78    | 91   |
| 47              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | -     | 64   | 75    | 88   |
| 48              |        |      |       |      |         |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      |       |      | -     | 60   | 72    | 80   |

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