User´s guide API REST WOODCAL.COM

Una herramienta en la nube para el cálculo de uniones de madera

This is the user's guide of WOODCALC.COM to use the API REST service.

WOODCALC.COM is resource for improve different calculation tools. Allow calculate different timber joints.

This guide explains which are the parameters and what is the order, that you have use to program your own software (GUI, App, desktop programs...).

Funciones:

* CHARACTERISTIC VALUES
* DESIGN VALUES
* COMPRESSION PERPENDICULAR TO THE GRAIN
* COMPRESSIVE STRESSES AT AN ANGLE TO THE GRAIN
* NOTCHED MEMBERS
* MORTISE TENON PILLAR

# CHARACTERISTIC VALUES

This function gives you the characteristic values of a number of timber properties for different strength classes.

These values are based on UNE-EN-338 for solid timber and UNE-EN-14080 for Glue Laminated timber.

These values will be used in the other functions implemented by WoodCalc.

### INPUT PARAMETERS FOR CHARACTERISTIC VALUES

This is what the url looks like:

http://woodcalc.com/CharacteristicValues/?s=C14&format=xml

The inputs are:

* **s =** the alpha-numeric code of the strength classes.

Softwood: C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 or C50.

Hardwood: D18, D24, D30, D35, D40, D50, D60 or D70

Homogenous Glue Laminated: GL20h, GL22h, GL24h, GL26h, GL28h or GL30h

Combined Glue Laminated: GL20c, GL22c, GL24c, GL26c, GL28c or GL30c

* **Format**= choose the language you wish the output to be in. Indicate either json or xml.

|  |  |  |
| --- | --- | --- |
| parameter | Description & units | input |
| **s** | the alpha-numeric code of the strength classes | C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 C50, D18, D24, D30, D35, D40, D50, D60, D70, GL20h, GL22h, GL24h, GL26h, GL28h, GL30h, GL20c, GL22c, GL24c, GL26c, GL28c or GL30c |
| format | Output´s language | json or xml |

### OUTPUT PARAMETERS FOR CHARACTERISTIC VALUES

This function gives you the characteristic values of a number of timber properties for the selected strength class.

In the case of solid timber, the output in json comes in the following format:

{"ID":"C14","fmk":14,"ft0k":8,"ft90k":0.4,"fc0k":16,"fc90k":2,"fvk":3,"E0mean":7,"E005":4.7,"E90mean":0.23,"Gmean":0.44,"rhok":290,"rhomean":350}

Where:

ID= Is the strength class selected.

fmk= Characteristic bending strength. In N/mm2.

ft0k= Characteristic tensile strength along the grain. In N/mm2.

ft90k= Characteristic tensile strength perpendicular to the grain. In N/mm2.

fc0k= Characteristic compressive strength along the grain. In N/mm2.

fc90k= Characteristic compressive strength perpendicular to grain. In N/mm2.

fvk= Characteristic shear strength. In N/mm2.

E0mean= Mean value of modulus of elasticity along the grain. In N/mm2.

E005= Fifth percentile value of modulus of elasticity. In N/mm2.

E90mean= Mean value of modulus of elasticity perpendicular to the grain. In N/mm2.

Gmean= Mean value of shear modulus. In N/mm2.

rhok= Characteristic density. In kg/m3.

rhomean= Mean density. In kg/m3.

And in the case of glue laminated timber:

{"ID":"GL24h","fmk":24,"ft0k":19.2,"ft90k":0.5,"fc0k":24,"fc90k":2.5,"fvk":3.5,"frgk":1.2,"E0mean":11500,"E005":9600,"E90mean":300,"E9005":250,"Gmean":650,"G05":540,"Grmean":65,"Gr05":54,"rhok":385,"rhomean":420}

Where:

ID= Is the strength class selected.

fmk= Characteristic bending strength. In N/mm2.

ft0k= Characteristic tensile strength along the grain. In N/mm2.

ft90k= Characteristic tensile strength perpendicular to the grain. In N/mm2.

fc0k= Characteristic compressive strength along the grain. In N/mm2.

fc90k= Characteristic compressive strength perpendicular to grain. In N/mm2.

fvk= Characteristic shear strength. In N/mm2.

frgk= Characteristic rolling shear stress. In N/mm2.

E0mean= Mean value of modulus of elasticity along the grain. In N/mm2.

E005= Fifth percentile value of modulus of elasticity along the grain. In N/mm2.

E90mean= Mean value of modulus of elasticity perpendicular to the grain. In N/mm2.

E9005= Fifth percentile value of modulus of elasticity perpendicular to the grain. In N/mm2.

Gmean= Mean value of shear modulus. In N/mm2.

G05= Fifth percentile value of shear modulus. In N/mm2.

Grmean= Mean value of rolling shear modulus. In N/mm2.

Gr05= Fifth percentile value of rolling shear modulus. In N/mm2.

rhok= Characteristic density. In kg/m3.

rhomean= Mean density. In kg/m3.

# DESIGN VALUES

This function gives you the design values for different strength classes. These values are based on UNE-EN-338 for solid timber and UNE-EN-14080 for Glue Laminated timber. Then the increase and decrease factors are applied in accordance with Eurocode 5 and CTE DB-SE-M.

These values will be used in the other functions implemented by WoodCalc.

### INPUT PARAMETERS FOR DESIGN VALUES

### The url for design values is the following:

<http://woodcalc.com/DesignValues/?s=GL24h&service=1&LoadDuration=S&b=70&h=70&Ksys=true&Kh=true&gammaM=1.30&format=json>

Inputs parameters are as follows:

* **s =** the alpha-numeric code of the strength classes.

Softwood: C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 or C50.

Hardwood: D18, D24, D30, D35, D40, D50, D60 or D70

Homogenous Glue Laminated: GL20h, GL22h, GL24h, GL26h, GL28h or GL30h

Combined Glue Laminated: GL20c, GL22c, GL24c, GL26c, GL28c or GL30c

* **service** = The service class is indicated by introducing the number of the corresponding service class, 1, 2 or 3
* **LoadDuration**= Load duration is indicated by introducing one of the following parameters : I, S,M L or P

|  |  |  |
| --- | --- | --- |
| Load-duration class | Order of accumulated duration of characteristic load | Input |
| Permanent | More than 10 years | P |
| Long-term | 6months – 10 years | L |
| Medium-term | 1 week -6 months | M |
| Short-term | Less than one week | S |
| Instantaneous |  | I |

* **b** =width measured in millimeters(mm)
* **h**= Depth measured in millimeters (mm)
* **Ksys** = Load sharing factor. Introduce true or false for the load sharing factor to be considered or not, respectively.
* **Kh**= Depth factor. Introduce true or false for the depth factor to be considered or not, respectively.
* **gammaM**= Partial factor for material properties, also accounting for model uncertainties and dimensional variations. This input is a number.

|  |  |
| --- | --- |
| Fundamental combinations: |  |
| Solid timber | 1,3 |
| Glued laminated timber | 1,25 |
| LVL, plywood, OS8, | 1,2 |
| Particleboards | 1,3 |
| Fibreboards, hard | 1,3 |
| Fibreboards, medium | 1,3 |
| Fibreboards, MDF | 1,3 |
| Fibreboards, soft | 1,3 |
| Connections | 1,3 |
| Punched metal plate fasteners | 1,25 |
| Accidental combinations | 1,0 |

* **Format**= choose the language you wish the output to be in. Indicate either json or xml.

|  |  |  |
| --- | --- | --- |
| parameter | Description & units | input |
| s | the alpha-numeric code of the strength classes | C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 C50, D18, D24, D30, D35, D40, D50, D60, D70, GL20h, GL22h, GL24h, GL26h, GL28h, GL30h, GL20c, GL22c, GL24c, GL26c, GL28c or GL30c |
| Format | Output´s language | json or xml |
| service | The service class | 1, 2 or 3 |
| LoadDuration | Load duration of the principal charge | P, L, M, S or I |
| b | width measured in millimeters | A number |
| h | Depth measured in millimeters | A number |
| ksys | Load sharing factor | true or false |
| kh | Depth factor | true or false |
| gammaM | Partial factor for material properties | A number |
| format | Output´s language | json or xml |

### OUTPUT PARAMETERS FOR DESIGN VALUES

The output obtained are the design values for the selected strength class. In the case of solid timber, the output in json comes in the following format:

{"fmd":"21.29","ft0d":"11.29","ft90d":"0.28","fc0d":"14.54","fc90d":"1.73","fvd":"2.77"}

Where:

**fmd**= Design bending strength.

**ft0d**= Design tensile strength along the grain.

**ft90d**= Design tensile strength perpendicular to the grain.

**fc0d**= Design compressive strength along the grain.

**fc90d**= Design compressive strength perpendicular to grain.

**fvd**= Design shear strength.

And in glued laminated timber:

{"fmd":"20.10","ft0d":"14.62","ft90d":"0.35","fc0d":"16.62","fc90d":"1.73","fvd":"2.42"}

Where:

**fmd**= Design bending strength.

**ft0d**= Design tensile strength along the grain.

**ft90d**= Design tensile strength perpendicular to the grain.

**fc0d**= Design compressive strength along the grain.

**fc90d**= Design compressive strength perpendicular to grain.

**fvd**= Design shear strength.

# COMPRESSION PERPENDICULAR TO THE GRAIN

This function assesses compression perpendicular to the grain. This check is important to avoid crushing timber.

In this case Eurocode 5 and CTE DB-SE-M have been followed.

### INPUTS

### The url for compression perpendicular to the grain is the following:

<http://woodcalc.com/CompressionPerpendicularToTheGrain?Fd=14752&b=90&l=70&a1=0&a2=30&l1=1000&h=300&Continuous=false&s=GL24h&service=1&LoadDuration=S&gammaM=1.25&format=json>

Where:

* **Fd**= Is the design force in Newtons.
* **b** = width measured in millimeters
* **l** = is the contact length measured in millimeters
* **a1** , **a2**, increased contact length at each side by 30mm, but not more than a, l or l1/2. The REST API considered the minimum of these values. This values is introduced in millimeters.
* **l1** = distance between contact areas measured in millimeters.
* **h** = Depth measured in milimeters.
* **continuous** = Design parameter. Introduce true or false for continuous support to continuous design or discrete design, respectively.
* **s** = the alpha-numeric code of the strength classes.

Softwood: C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 or C50.

Hardwood: D18, D24, D30, D35, D40, D50, D60 or D70

Homogenous Glue Laminated: GL20h, GL22h, GL24h, GL26h, GL28h or GL30h

Combined Glue Laminated: GL20c, GL22c, GL24c, GL26c, GL28c or GL30c

* **service** = The service class is indicated by introducing the number of the corresponding service class, 1, 2 or 3
* **LoadDuration**= Load duration is indicated by introducing one of the following parameters : I, S,M L or P

|  |  |  |
| --- | --- | --- |
| Load-duration class | Order of accumulated duration of characteristic load | Input |
| Permanent | More than 10 years | P |
| Long-term | 6months – 10 years | L |
| Medium-term | 1 week -6 months | M |
| Short-term | Less than one week | S |
| Instantaneous |  | I |

* **gammaM**, Partial factor for material properties, also accounting for model uncertainties and dimensional variations

|  |  |
| --- | --- |
| Fundamental combinations: |  |
| Solid timber | 1,3 |
| Glued laminated timber | 1,25 |
| LVL, plywood, OS8, | 1,2 |
| Particleboards | 1,3 |
| Fibreboards, hard | 1,3 |
| Fibreboards, medium | 1,3 |
| Fibreboards, MDF | 1,3 |
| Fibreboards, soft | 1,3 |
| Connections | 1,3 |
| Punched metal plate fasteners | 1,25 |
| Accidental combinations | 1,0 |

* **format**= choose the language you wish the output to be in. Indicate either json or xml.

|  |  |  |
| --- | --- | --- |
| parameter | Description & units | input |
| Fd | Design force in Newtons | A number |
| b | width measured in millimeters | A number |
| l | contact length measured in millimeters | A number |
| a1 | increased contact length | A number |
| a2 | increased contact length | A number |
| l1 | distance between contact areas measured in millimeters | A number |
| h | Depth measured in millimeters | A number |
| continuous | Design parameter | true or false |
| s | the alpha-numeric code of the strength classes | C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 C50, D18, D24, D30, D35, D40, D50, D60, D70, GL20h, GL22h, GL24h, GL26h, GL28h, GL30h, GL20c, GL22c, GL24c, GL26c, GL28c or GL30c |
| service | The service class | 1, 2 or 3 |
| LoadDuration | Load duration of the principal charge | P, L, M, S or I |
| gammaM | Partial factor for material properties | A number |
| format | Output´s language | json or xml |

The REST API calculates the index following Eurocode 5 and CTE DB-SE-M.

### OUTPUTS

The output obtained with woodcalc.com CompressionPerpendicularToTheGrain results from the equations in Eurocode 5 and CTE DB-SE-M.

{"sigmaC90d":"1.64","fc90d":"1.80","areaEf":"9000","kc90":"1.75","index":"0.52"}

Where:

**sigmaC90d =** Design compressive stress perpendicular to the grain measured in N/mm2

**fc90d** = Design compressive strength perpendicular to the grain measured in N/mm2

**areaEf** = Effective contact area in compression perpendicular to the grain measured in mm2

**kc90** = is a factor taking into account the load configuration, the possibility of splitting and the

degree of compressive deformation.

**index** = This value checks the 6.3 formula of EN 1995-1-1:20004+A1:2008 and should be lower or equal than 1

# COMPRESSIVE STRESSES AT AN ANGLE TO THE GRAIN

This function assesses compressive stresses at an angle to the grain. This check is important to avoid crushing timber.

In this case there are two diferent ways to made the assesses. Eurocode 5 and CTE DB-SE-M is one way and DIN1052:2008 is the other.

### INPUTS

### The url for compressive stresses at an angle to the grain following Eurocode 5 is:

<http://woodcalc.com/CompressiveStressesAtAnAngleToTheGrainEURO/?falfaD=1&b=90&l=70&l1=70&c1=0&c2=30&h=300&Continuous=false&s=GL24h&service=1&LoadDuration=S&gammaM=1.25&alfaGr=30.5&format=json>

And the url for compressive stresses at an angle to the grain following DIN1052:2008 is:

<http://woodcalc.com/CompressiveStressesAtAnAngleToTheGrainDIN/?falfaD=1&b=90&l=70&l1=70&c1=0&c2=30&h=300&Continuous=false&s=GL24h&service=1&LoadDuration=S&gammaM=1.25&alfaGr=30.5&format=json>

Where:

* **falfaD**= Is the design force in Newtons.
* **b** = width measured in millimeters
* **l** = is the contact length measured in millimeters
* **l1** = distance between contact areas measured in millimeters.
* **c1** , **c2**, increased contact length at each side by 30·senα mm, but not more than a, l or l1/2. The REST API considered the minimum of these values. This values are introduced in millimeters.
* **h** = Depth measured in milimeters.
* **Continuous** = Design parameter. Introduce true or false for continuous support to continuous design or discrete design, respectively.
* **s** = the alpha-numeric code of the strength classes.

Softwood: C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 or C50.

Hardwood: D18, D24, D30, D35, D40, D50, D60 or D70

Homogenous Glue Laminated: GL20h, GL22h, GL24h, GL26h, GL28h or GL30h

Combined Glue Laminated: GL20c, GL22c, GL24c, GL26c, GL28c or GL30c

* **service** = The service class is indicated by introducing the number of the corresponding service class, 1, 2 or 3
* **LoadDuration**= Load duration is indicated by introducing one of the following parameters : I, S,M L or P

|  |  |  |
| --- | --- | --- |
| Load-duration class | Order of accumulated duration of characteristic load | Input |
| Permanent | More than 10 years | P |
| Long-term | 6months – 10 years | L |
| Medium-term | 1 week -6 months | M |
| Short-term | Less than one week | S |
| Instantaneous |  | I |

* **gammaM**, Partial factor for material properties, also accounting for model uncertainties and dimensional variations

|  |  |
| --- | --- |
| Fundamental combinations: |  |
| Solid timber | 1,3 |
| Glued laminated timber | 1,25 |
| LVL, plywood, OS8, | 1,2 |
| Particleboards | 1,3 |
| Fibreboards, hard | 1,3 |
| Fibreboards, medium | 1,3 |
| Fibreboards, MDF | 1,3 |
| Fibreboards, soft | 1,3 |
| Connections | 1,3 |
| Punched metal plate fasteners | 1,25 |
| Accidental combinations | 1,0 |

* **alfaGr** angle between the force and the grain direction measured in degrees.
* **format**= choose the language you wish the output to be in. Indicate either json or xml.

|  |  |  |
| --- | --- | --- |
| parameter | Description & units | input |
| Falfad | Design force in Newtons | A number |
| b | width measured in millimeters | A number |
| l | contact length measured in millimeters | A number |
| l1 | distance between contact areas measured in millimeters | A number |
| c1 | increased contact length | A number |
| c2 | increased contact length | A number |
| h | Depth measured in millimeters | A number |
| continuous | Design parameter | true or false |
| s | the alpha-numeric code of the strength classes | C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 C50, D18, D24, D30, D35, D40, D50, D60, D70, GL20h, GL22h, GL24h, GL26h, GL28h, GL30h, GL20c, GL22c, GL24c, GL26c, GL28c or GL30c |
| service | The service class | 1, 2 or 3 |
| LoadDuration | Load duration of the principal charge | P, L, M, S or I |
| gammaM | Partial factor for material properties | A number |
| alfaGr | angle between the force and the grain direction measured in degrees | A number |
| format | Output´s language | json or xml |

### OUTPUTS

The output obtained with woodcalc.com CompressiveStressesAtAnAngleToTheGrainEURO results from the equations in Eurocode 5 and CTE DB-SE-M.

{"areaEf":"6300","kc90":"1.00","fcalfaD":"5.37","index":"0.00"}

Where:

**areaEf** = Effective contact area in compression perpendicular to the grain measured in mm2

**kc90** = is a factor taking into account the load configuration, the possibility of splitting and the

degree of compressive deformation.

**fcalfaD** = Design compressive stress at an angle to the grain measured in N/mm2

**index** = This value checks the 6.3 formula of EN 1995-1-1:20004+A1:2008 and should be lower or equal than 1

The output obtained with woodcalc.com CompressiveStressesAtAnAngleToTheGrainDIN results from the equations in DIN 1052:2008.

{"areaEf":"6300","kc90":"1.00","fcalfaD":"5.29","kcalf":"1.00","index":"0.00"}

**areaEf** = Effective contact area in compression perpendicular to the grain measured in mm2

**kc90** = is a factor taking into account the load configuration, the possibility of splitting and the

degree of compressive deformation.

**fcalfaD** = Design compressive stress at an angle to the grain measured in N/mm2.

**kcalf** = is a factor taking into account the load configuration, the possibility of splitting and the

degree of compressive deformation and the angle to the grain.

**index** = This value checks the compressive stress at an angle to the grain according to DIN 1052:2008 and should be lower or equal than 1.

# NOTCHED MEMBERS

This function assesses notched members.

In this case Eurocode 5, DIN 1052:2009 and CTE DB-SE-M have been followed.

### INPUTS

### The url for notched members is the following:

<http://woodcalc.com/NotchedMembers/?Vd=14752&b=90&hef=70&h=5&Kcr=false&d=97&s=GL24h&x=4&service=1&LoadDuration=S&gammaM=1.25&notchOnSupport=true&format=json>

Where:

* **Vd**= Is the design force in Newtons.
* **b** = width measured in millimeters
* **hef** = is the effective (reduced) depth measured in millimetres.
* **h** = Depth measured in milimeters.
* **kcr** = Is a factor that consider the influence of cracks. Introduce true or false for the influence of cracks factor to be considered or not, respectively.
* **d=** length of the notch measured in millimeters.
* **l1** = distance between contact areas measured in millimeters.
* **s** = the alpha-numeric code of the strength classes.

Softwood: C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 or C50.

Hardwood: D18, D24, D30, D35, D40, D50, D60 or D70

Homogenous Glue Laminated: GL20h, GL22h, GL24h, GL26h, GL28h or GL30h

Combined Glue Laminated: GL20c, GL22c, GL24c, GL26c, GL28c or GL30c

* **service** = The service class is indicated by introducing the number of the corresponding service class, 1, 2 or 3
* **LoadDuration**= Load duration is indicated by introducing one of the following parameters : I, S,M L or P

|  |  |  |
| --- | --- | --- |
| Load-duration class | Order of accumulated duration of characteristic load | Input |
| Permanent | More than 10 years | P |
| Long-term | 6months – 10 years | L |
| Medium-term | 1 week -6 months | M |
| Short-term | Less than one week | S |
| Instantaneous |  | I |

* **gammaM**, Partial factor for material properties, also accounting for model uncertainties and dimensional variations

|  |  |
| --- | --- |
| Fundamental combinations: |  |
| Solid timber | 1,3 |
| Glued laminated timber | 1,25 |
| LVL, plywood, OS8, | 1,2 |
| Particleboards | 1,3 |
| Fibreboards, hard | 1,3 |
| Fibreboards, medium | 1,3 |
| Fibreboards, MDF | 1,3 |
| Fibreboards, soft | 1,3 |
| Connections | 1,3 |
| Punched metal plate fasteners | 1,25 |
| Accidental combinations | 1,0 |

* **notchOnSupport:** Introduce true or false to indicate if the notch is on the same side as the support or not, respectively.
* **format**= choose the language you wish the output to be in. Indicate either json or xml.

|  |  |  |
| --- | --- | --- |
| parameter | Description & units | input |
| Vd | Design force in Newtons | A number |
| b | width measured in millimeters | A number |
| hef | Effective depth measured in millimeters | A number |
| h | Depth measured in millimeters | A number |
| kcr | factor that consider the influence of cracks | true or false |
| d | length of the notch in millimeters | A number |
| l1 | distance between contact areas measured in millimeters | A number |
| s | the alpha-numeric code of the strength classes | C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 C50, D18, D24, D30, D35, D40, D50, D60, D70, GL20h, GL22h, GL24h, GL26h, GL28h, GL30h, GL20c, GL22c, GL24c, GL26c, GL28c or GL30c |
| service | The service class | 1, 2 or 3 |
| LoadDuration | Load duration of the principal charge | P, L, M, S or I |
| gammaM | Partial factor for material properties | A number |
| notchOnSupport | Design parameter | true or false |
| format | Output´s language | json or xml |

The REST API calculates the index following Eurocode 5, DIN 1052:2008 and CTE DB-SE-M.

### OUTPUTS

The output obtained with woodcalc.com NotchedMembers results from the equations in Eurocode 5, CTE DB-SE-M and DIN1052:2008.

{"Kn":"6.50","Kv":"1.00","Fvd":"2.52","TauD":"3.51","index":"1.39"}

**Kn**= notched factor

**Kv=** is a reduction factor

**Fvd=** Design shear strength

**TauD=** Design shear stress

**Index=** This value checks the 6.60 formula of EN 1995-1-1:20004+A1:2008, the 6.69 formula of CTE DS-SE-M and the 144 formula of DIN 1052:2008 and should be lower or equal than 1.

# MORTISE TENON PILLAR

This function assesses mortise and tenon working as a pillar. This check is important to avoid crushing timber.

### INPUTS

### The url for mortise and tenon working as a pillar is the following:

http://woodcalc.com/MortiseTenonPillar/?Nd=21&b=21&hprime=21&bprime=21&lprime=21&a1=21&a2=21&l1=21&h=21&Continuous=true&s=C14&service=1&LoadDuration=P&gammaM=1.3&format=json

Where:

* **Nd**= Is the design axial force of the pillar in Newtons.
* **b** = width measured in millimeters
* **hprime** = Depth measured in milimeters.
* **bprime** = width of the mortise measured in millimeters (suggestion b/3)
* **lprime** = is the length of the mortise measured in millimeters (suggestion hprime\*4/5)
* **a1** , **a2**, increased contact length at each side by 30mm, but not more than a, l or l1/2. The REST API considered the minimum of these values. This values is introduced in millimeters.
* **l1** = distance between contact areas measured in millimeters.
* **h** = Depth measured in milimeters.
* **continuous** = Design parameter. Introduce true or false for continuous support to continuous design or discrete design, respectively.
* **s** = the alpha-numeric code of the strength classes.

Softwood: C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 or C50.

Hardwood: D18, D24, D30, D35, D40, D50, D60 or D70

Homogenous Glue Laminated: GL20h, GL22h, GL24h, GL26h, GL28h or GL30h

Combined Glue Laminated: GL20c, GL22c, GL24c, GL26c, GL28c or GL30c

* **service** = The service class is indicated by introducing the number of the corresponding service class, 1, 2 or 3
* **LoadDuration**= Load duration is indicated by introducing one of the following parameters : I, S,M L or P

|  |  |  |
| --- | --- | --- |
| Load-duration class | Order of accumulated duration of characteristic load | Input |
| Permanent | More than 10 years | P |
| Long-term | 6months – 10 years | L |
| Medium-term | 1 week -6 months | M |
| Short-term | Less than one week | S |
| Instantaneous |  | I |

* **gammaM**, Partial factor for material properties, also accounting for model uncertainties and dimensional variations

|  |  |
| --- | --- |
| Fundamental combinations: |  |
| Solid timber | 1,3 |
| Glued laminated timber | 1,25 |
| LVL, plywood, OS8, | 1,2 |
| Particleboards | 1,3 |
| Fibreboards, hard | 1,3 |
| Fibreboards, medium | 1,3 |
| Fibreboards, MDF | 1,3 |
| Fibreboards, soft | 1,3 |
| Connections | 1,3 |
| Punched metal plate fasteners | 1,25 |
| Accidental combinations | 1,0 |

* **format**= choose the language you wish the output to be in. Indicate either json or xml.

|  |  |  |
| --- | --- | --- |
| parameter | Description & units | input |
| Nd | Design force in Newtons | A number |
| b | width measured in millimeters | A number |
| hprime | Depth measured in milimeters (contact length) | A number |
| bprime | width of the mortise measured in millimeters | A number |
| lprime | is the length of the mortise measured in millimeters | A number |
| a1 | increased contact length | A number |
| a2 | increased contact length | A number |
| l1 | distance between contact areas measured in millimeters | A number |
| h | Depth measured in millimeters | A number |
| continuous | Design parameter | true or false |
| s | the alpha-numeric code of the strength classes | C14, C16, C18, C20, C22, C24, C27, C30, C35, C40, C45 C50, D18, D24, D30, D35, D40, D50, D60, D70, GL20h, GL22h, GL24h, GL26h, GL28h, GL30h, GL20c, GL22c, GL24c, GL26c, GL28c or GL30c |
| service | The service class | 1, 2 or 3 |
| LoadDuration | Load duration of the principal charge | P, L, M, S or I |
| gammaM | Partial factor for material properties | A number |
| format | Output´s language | json or xml |

The REST API calculates the index based on Eurocode 5 and CTE DB-SE-M.

### OUTPUTS

The output obtained with woodcalc.com MortiseTenonPillar is:

{"sigmaC90d":"0.05","fc90d":"0.92","areaEf":"441","kc90":"1.00","index":"0.05"}

Where:

**sigmaC90d =** Design compressive stress perpendicular to the grain measured in N/mm2

**fc90d** = Design compressive strength perpendicular to the grain measured in N/mm2

**areaEf** = Effective contact area in compression perpendicular to the grain measured in mm2

**kc90** = is a factor taking into account the load configuration, the possibility of splitting and the

degree of compressive deformation.

**index** = This value should be lower or equal than 1.