# PERFECTLY SIMPLE SIMPLY PERFECT

**SHERPA TIMBER CONNECTIONS** 



SHERPA

# **MULTI-FUNCTIONAL FOR WALL,** FLOOR AND STRUCTURE

### **Function of SHERPA-series**

SHERPA-connectors consist of two aluminum parts, which in principle create a form-fitting connection like a traditional dovetail connection.

Forces can be transferred in installation direction, perpendicular to the installation direction, in tension and compression as well as moments in all three spatial axes.



STRUCTURAL SYSTEMS, FIRE-PROTECTION... starting page 4

**SHERPA-CONNECTOR-SYSTEMS** 

**USAGE EXAMPLES AND PRODUCT SELECTION** starting page 15

# **INNOVATIVE**CONNECTOR-SYSTEM

A simple system for virtually limitless usability. Usage in timber constructions, commercial construction, residential and non-residential construction, for bridges, solariums, balconies or staircases, in furniture construction, for fences, carpentry, and many more:

Peggardless of what you are designing a using the SHEPPA-connector system will lead to a high

Regardless of what you are designing - using the SHERPA-connector system will lead to a high level of pre-fabrication and reduced assembly times.

The wide variety of available connectors is tailor-made for the task at hand and ensures a durable, long lasting and reliable load transfer.

### **Timber-Series**



Roof- Wall- and timber structures connections, traditional beam to joist connections

### **XL-Series**



For high capacity engineered timber structures

### **Assembly-Series**



For balconies, carports, staircases, podiums, wall connections, solarium

SHERPA-SERVICE, TECHNICAL SUPPORT- HOTLINE

ORDERING...
starting page 30

ASSEMBLY INSTRUCTIONS, CONFIGURATION PROPER SCREW INSTALLATION, EDGE DISTANCES... starting page 22



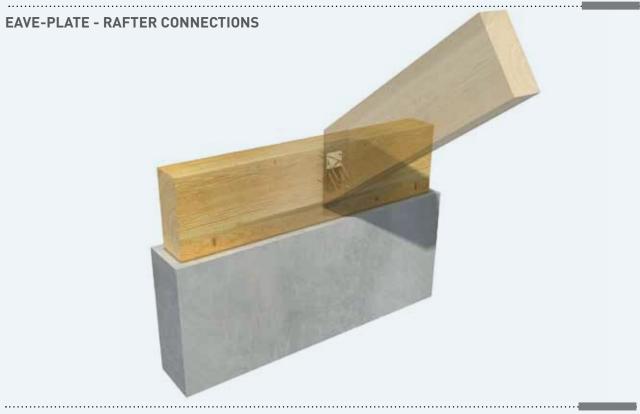
# Connections

### **BEAM - JOIST CONNECTIONS**



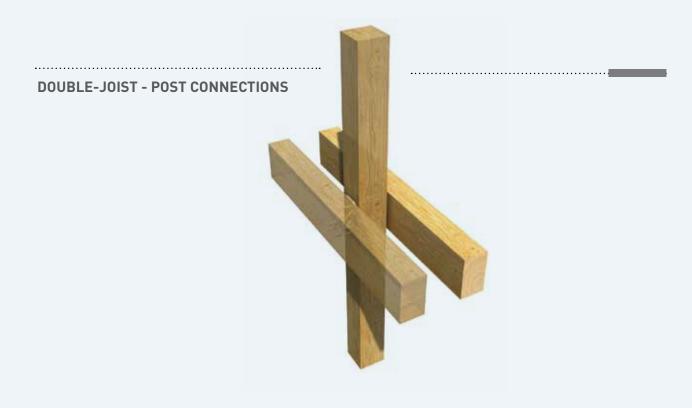
### **HEADERS**





**EAVE-PLATE - COLLAR-TIE CONNECTIONS** 









### **INCLINED CONNECTIONS TO COLUMN**



INCLINED CONNECTIONS TO PLATES/BEAMS



RADIAL JOISTS/BEAMS TO COLUMN CONNECTIONS



### **FACADE ELEMETS CONNECTIONS**



# **Structures**

### **STAR-SHAPED STRUCTURES**





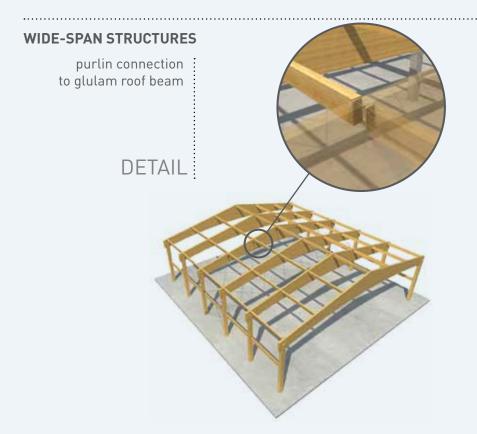
### **CIRCULAR STRUCTURES**



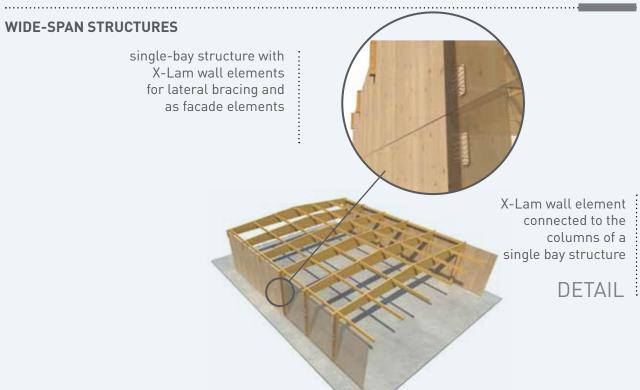
### **WIDE-SPAN STRUCTURES**

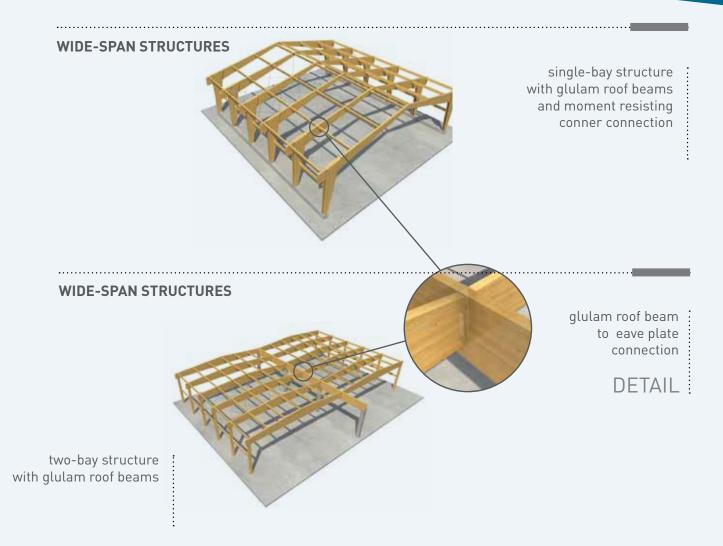


single-bay structure with
glulam roof beam using
SHERPA-connectors
to connect to roof beam
with the sawn-timber
or glulam lateral
bracing members



single-bay structure with glulam roof beam

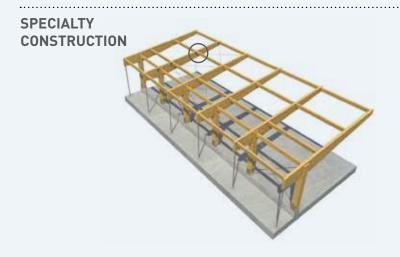




### **MULITI-STORY RESIDENTIAL AND OFFICE BUILDINGS**



multi-storey
residential and
office building in
skeleton construction
with X-Lam wall and
floor elements



Stadium-stands roof

### PEDESTRIAN AND CYCLIST BRIDGES



Pedestrian and cyclist bridge with glulam main beams and hung-in glulam joists with bridge deck in X-Lam construction :

## **Connections to Concrete I Brick I Steel**

Connections for timber elements with SHERPA-connectors to surfaces of Concrete | Brick | Steel are currently being developed and will be available shortly.

More information on the current development on this topic is available on our homepage www.sherpa-connector.com.

**WOOD-CONCRETE OR** WOOD-BRICK





### Fire - Protection

There are currently no methods available to directly calculate the fire rating of the SHERPA - connectors like there are for wooden members. However, the edge distances of the screws for SHERPA - connectors are designed, with the appropriated protection of the SHERPA - connectors side faces in place, to achive a 30 minute fire rating. If a higher fire rating is required, it can be achieved by applying appropriate constructive fire protection means.

### Examples for methods are:

 covering of the connector with wood strips or similar



 fully or partially housing the connector and filling of the gaps with fire inhibiting or retarding caulking



 covering the side faces of the SHERPA - connector with fire retarding materials and coating the connecting beam with products that create foam in a fire situation



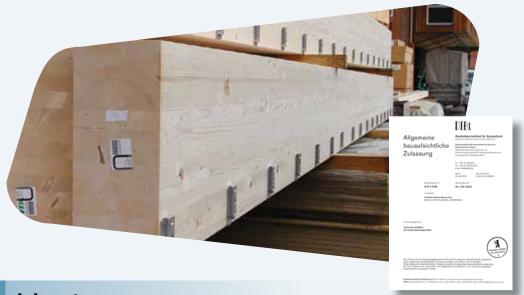
Research to further study and clarify the behaviour of the SHERPA - connector in fire situations are currently being set up. Results of the research are expected in the near future. Up to date information regarding this topic will be published on the website www.sherpa-connector.com. A strategy to estimate the fire rating of a connection using SHERPA - connectors is shown in an example in section 6.2.11 of the SHERPA - handbook.



# **TIMBER-SERIES**

# Area of application

The SHERPA Timber-connector system is particularly flexible in its application. It finds application for roof, wall and structures connections as much as it does for traditional beam to joist connections.





General construction approval from the "Deutschen Institut für Bautechnik, Berlin" (German Institute for construction technology, Berlin) for the connectors of the SHERPA - timber series Z-9.1-558

# **Advantages**

- ✓ Simple and safe design and calculation
- Economical pre-assembly at the plant
- ✓ Fast assembly on the construction site
- ✓ Load capacities of 5 to 70 kN (1120 to 15730 lb)



### **Timber-Series selection**



Dimensions: 80x210 mm Thickness: 20 mm Screws: 12x 8x120, 6x 8x80

to attach beams and joists

| Scr           | ews         | characteristic/design value (un-factored) |       |
|---------------|-------------|---|-------|
| End-grain     | Side-grain  | (acc. approval Z-9.1-558)                 |       |
| 12 pcs. 8x120 | 6 pcs. 8x80 | 36,0 kN (8090 lb)                         | <br>D |





Dimensions: 53x180 m Thickness: 20 mm Screws: 10x 8x120, 5x 8x80

designed for slender cross-sections

| Scre          | ews         | characteristic/design value (un-factored) |     |
|---------------|-------------|---|-----|
| End-grain     | Side-grain  | (acc. approval Z-9.1-558)                 |     |
| 10 pcs. 8x120 | 5 pcs. 8x80 | 30,0 kN (6740 lb)                         | (E) |
|               |             |   |     |







Dimensions: 80x120 mm Thickness: 20 mm Screws: 6x 8x120, 3x 8x80

ideal for ceiling joists

| Scr          | ews         | characteristic/design value (un-factored) |   |
|--------------|-------------|---|---|
| End-grain    | Side-grain  | (acc. approval Z-9.1-558)                 |   |
| 6 pcs. 8x120 | 3 pcs. 8x80 | 15,0 kN (3370 lb)                         | 1 |





Dimensions: 60x80 mm Thickness: 20 mm Screws: 4x 8x120, 2x 8x80

for walls, ceilings and joists

|       | Scr     | ews         | characteristic/design value (un-factored) |         |
|-------|---------|-------------|---|---------|
| End   | -grain  | Side-grain  | (acc. approval Z-9.1-558)                 |         |
| 4 pcs | . 8x120 | 2 pcs. 8x80 | 8,0 kN (1790 lb)                          | <br>(B) |





Dimensions: 80x180 mm Thickness: 20 mm Screws: 10x 8x120, 5x 8x80 often used for angular/inclined

connections

| Scr           | ews         | characteristic/design value (un-factored) |     |
|---------------|-------------|---|-----|
| End-grain     | Side-grain  | (acc. approval Z-9.1-558)                 |     |
| 10 pcs. 8x120 | 5 pcs. 8x80 | 30,0 kN (6740 lb)                         | non |
|               |             |   |     |





Dimensions: 80x150 mi Thickness: 20 mm Screws: 8x 8x120, 4x 8x80

ideal to attach joists

| End-grain Side-grain (acc. approval Z-9.1-558) | Scr          | ews         | characteristic/design value (un-factored) |         |
|--|--------------|-------------|---|---------|
| 8 nce 8v120 / nce 8v80 20 0 kN (47/0 lh)       | End-grain    | Side-grain  | (acc. approval Z-9.1-558)                 |         |
| 6 pcs. 6x126 4 pcs. 6x60 20,6 kW (6746 tb)     | 8 pcs. 8x120 | 4 pcs. 8x80 | 20,0 kN (6740 lb)                         | <br>(B) |





Dimensions: 65x120 mm Thickness: 20 mm Screws: 6x 8x120, 3x 8x80

ideal for ceilings

| Scr         | ews         | characteristic/design value (un-factored) |   |
|-------------|-------------|---|---|
| End-grain   | Side-grain  | (acc. approval Z-9.1-558)                 |   |
| 6 pcs.8x120 | 3 pcs. 8x80 | 12,0 kN (2690 lb)                         | Ē |





Dimensions: 60x80 mn Thickness: 20 mm Screws: 6x 8x80



Not suitable for long load durations, suggested for installation/mounting only.

mentsandstick-framed panels

| End-grain side-grain                      | Scr          | ews         | characteristic/design value (un-factored)  |
|---|--------------|-------------|--|
| 4 ncs 8x120 2 ncs 8x80 3.0 kN (470 lh)    | End-grain    | side-grain  | characteristic/design value (dir-lactored) |
| 4 pcs. 6x126 2 pcs. 6x66 6,6 k14 (676 tb) | 4 pcs. 8x120 | 2 pcs. 8x80 | 3,0 kN (670 lb)                            |





Dimensions: 50x80 mm Thickness: 20 mm Screws: 4x 8x120, 2x 8x80

can be used to connect fixed elements like windows for example

| Scr          | ews         | characteristic/design value (un-factored) |       |
|--------------|-------------|---|-------|
| End-grain    | Side-grain  | (acc. approval Z-9.1-558)                 |       |
| 4 pcs. 8x120 | 2 pcs. 8x80 | 8,0 kN (1790 lb)                          | <br>D |





Dimensions: 40x110 mm Thickness: 12 mm

Screws: 23 pcs. 5x60 fully-threaded

| Scr          | ews          | characteristic/design value (un-factored) |              |
|--------------|--------------|---|--------------|
| End-grain    | Side-grain   | (acc. approval Z-9.1-558)                 |              |
| 13 pcs. 5x60 | 11 pcs. 5x60 | 12,8 kN (2870 lb)                         | ( <u>f</u> ) |





Dimensions: 55x110 mm Thickness: 12 mm

Screws: 24 pcs. 5x60 fully-threaded

| Scr          | ews          | characteristic/design value (un-factored) |         |
|--------------|--------------|---|---------|
| End-grain    | Side-grain   | (acc. approval Z-9.1-558)                 |         |
| 13 pcs. 5x60 | 11 pcs. 5x60 | 12,8 kN (2870 lb)                         | <br>(I) |



### Series - S5

Dimensions: 55x150 mm

Thickness: 12 mm

Screws: 30 pcs. 5x60 fully-threaded

| Scr          | ews          | characteristic/design value (un-factored) |         |
|--------------|--------------|---|---------|
| End-grain    | Side-grain   | (acc. approval Z-9.1-558)                 |         |
| 17 pcs. 5x60 | 13 pcs. 5x60 | 20,9 kN (4690 lb)                         | <br>(B) |



### Series - S1

Dimensions: 40x60 mm Thickness: 12 mm

Screws: 15 pcs. 5x60 fully-threaded

| Scr         | ews         | characteristic/design value (un-factored) |       |  |
|-------------|-------------|---|-------|--|
| End-grain   | Side-grain  | (acc. approval Z-9.1-558)                 |       |  |
| 8 pcs. 5x60 | 7 pcs. 5x60 | 5,6 kN (1250 lb)                          | <br>D |  |



### Series - S3

Dimensions: 40x150 mm

Thickness: 12 mm Screws: 30 pcs. 5x60 fully-threaded

| Scr          | ews          | characteristic/design value (un-factored) |      |
|--------------|--------------|---|------|
| End-grain    | Side-grain   | (acc. approval Z-9.1-558)                 |      |
| 17 pcs. 5x60 | 13 pcs. 5x60 | 18,7 kN (4200 lb)                         | 100M |
| 17 pcs. 5x60 | 13 pcs. 5x60 | 18,7 KN (4200 lb)                         |      |

Please also note the screw setting references found on page 23.

# **XL-SERIES**

# Area of application

SHERPA XL high capacity-connectors for use in engineered timber construction. A competitive advantange for timber structures compared to steel and reinforced concrete structures can be achieved due to the standardized design and implementation of the SHERPA - system.





General construction approval from the "Deutschen Institut für Bautechnik, Berlin" (German Institute for construction technology, Berlin) for the connectors of the SHERPA - timber series Z-9.1-788

- ✓ Simple and safe design and calculation
- Economical pre-assembly at the plant
- ✓ Fast assembly on the construction site
- ✓ Complex structures and connections can be design to load capacities of 55 to 280 kN (12360 to 62940 lb)







### **XL-Series selection**



### **DXL 280**

Dimensions: 140x605 mm Thickness: 20 mm

Screws: 63 pcs. 8x160 fully-threaded

Screws

characteristic/design value (un-factored) (acc. approval Z-9.1-778)

54 pcs. 8x160 fully-threaded

ca. 280 kN (62940 lb)



### XL 190

Dimensions: 120x528 mm

Thickness: 20 mm

Screws: 40 pcs. 8x160 fully-threaded

|  | *** | 0000 | 2000 | 1. |  |
|--|-----|------|------|----|--|
|  |     |      |      |    |  |

Screws 40 pcs. 8 x 160 fully-threaded characteristic/design value (un-factored) (acc. approval Z-9.1-778) ca. 190 kN (42710 lb)



### XL 120

Dimensions: 120x408 mm

Thickness: 20 mm

Screws: 29 pcs. 8x160 fully-threaded

Screws

characteristic/design value (un-factored) (acc. approval Z-9.1-778)

29 pcs. 8x160 fully-threaded

ca. 120 kN (26970 lb)



### XL 80



Dimensions: 120x328 mm Thickness: 20 mm

Screws: 24 pcs. 8x160 fully-threaded

Screws

characteristic/design value (un-factored) (acc. approval Z-9.1-778)

24 pcs. 8x160 fully-threaded

ca. 80 kN (17980 lb)



**XL 55** 

Dimensions: 120x248 mm Thickness: 20 mm

Screws: 18 pcs. 8x160 fully-threaded

characteristic/design value (un-factored) (acc. approval Z-9.1-778)

18 pcs. 8x160 fully-threaded

ca. 55 kN (12360 lb)



### XL 250

Dimensions: 120x608 mm Thickness: 20 mm

Screws: 48 pcs. 8x160 fully-threaded

Screws

characteristic/design value (un-factored) (acc. approval Z-9.1-778)

48 pcs. 8x160 fully-threaded

ca. 250 kN (56200 lb)



### **XL 140**

Dimensions: 120x448 mm

Thickness: 20 mm

Screws: 32 pcs. 8x160 fully-threaded

Screws

characteristic/design value (un-factored) (acc. approval Z-9.1-778)

32 pcs. 8x160 fully-threaded

ca. 140 kN (31470 lb)



25 pcs. 8x160 fully-threaded

### **XL 100**

Dimensions: 120x368 mm

Thickness: 20 mm

Screws: 25 pcs. 8x160 fully-threaded

characteristic/design value (un-factored) (acc. approval Z-9.1-778)

ca. 100 kN (22480 lb)



### XL 70

Dimensions: 120x288 mm Thickness: 20 mm

Screws: 21 pcs. 8x160 fully-threaded

Screws

characteristic/design value (un-factored) (acc. approval Z-9.1-778)

21 pcs. 8x160 fully-threaded

ca. 70 kN (15730 lb)

Please also note the screw setting references found on page 23.

# **ASSEMBLY-SERIES**

# Area of application

The SHERPA Assembly-connector system was developed particularly for the secure assembly of balconies, carports, stair treads, podiums, wall connections, solariums, fences and many more.



# **Advantages**

- ✓ easy to use for professionals and do-it-yourself's alike
- ✓ intuitive assembly
- ✓ secure connection
- easy assembly and take down for temporary structures(i. e. for events, outdoor catering/kitchen or similar)







# **Assembly-Series selection**



designed for solariums



Dimensions: Thickness: 20 mm Screws: 6x 5x60



40x80 mm



Dimensions: 35x55 m Thickness: 17 mm Screws: 6x 5x60



Multi



Dimensions: 80x96 mm / 60x96 mm Thickness: 20 mm Screws: 8x 8x80 1x safety wedge





Dimensions: 80x50 mm Thickness: 20 mm Screws: 4x 8x80



WTS6 special



Dimensions: 110x35 mm Thickness: 20 mm Screws: 9x 8x80 2x locking screw



ideal for wide handrails





Dimensions: 110x35 mm Thickness:  $20\,mm$ Screws: 9x 5x60 2x locking screw



WTS3 special

to attach heavy stair landings and treads

Dimensions: 55x35 mm Thickness: 20 mm Screws: 6x 5x60 1x locking screw

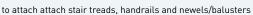


for heavy loads and pedestals/podiums





Thickness: 20 mm Screws: 6x 5x60 1x locking screw









mini 17



Dimensions: 17x40 mm Thickness/housing depth: 10 mm

Screws: 4 Stk. 3,5x35 Radius: 17 mm

### SHERPA special screws

Depending on the size and model of the SHERPA-connectors, different SHERPA special screws either fully or partially threaded with reinforced special head are used.

The entire SHERPA-concept is based on a system, in which the typ and quality of the applied screws have a significant effect on the quality and safety of the connection. The identified typs and sizes of screws have to be used in accordance to the general construction approval. A guarantee for the listed characteristic/design values can only be given for the use of the system consisting of SHERPA-connector and SHERPA-special screw.





SHERPA-special screws 8 x 80 mm / 8 x 120 mm and SHERPA-special screws 5 x 60 mm respectivel have to be used in compliance with the construction approval Z-9.1-558.

For the connectors of the SHERPA XL/DXL-Series, SHERPA-special screws 8 x 160 mm have to be used (Z-9.1-788). It is recommended to fasten these screws with a torque wrench to a torque of  $M_{\tau}$  = 20 Nm (14.75 lbft). the task.

No pre-drilling is required for the installation of the special screws of the SHERPA XL/DXL-Series, as the 8 x 160 mm-special feature a special screw tip (half tip) that prevents wood splitting.

# **Assembly instructions**

NOTICE: According to approval Z-9.1-558 SHERPA-special screws 8 x 80 mm / 8 x 120 mm have to be used.

SHERPA® A, B, C, C1, D, D1, E, F (with general construction approval)



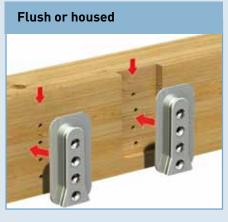
A2, KA, W8, WTS6 spezial, multi (Assembly connectors)

### **PLACEMENT**

# End-grain 8 x 120 mm

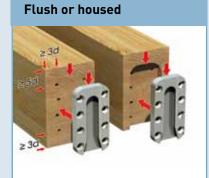
TheSHERPApart with the larger amount of holes has to be fastened to the end-grain (secondary beam).

# Side-grain 8 x 80 mm



AllSHERPA®-parts have centerline markings on the top/bottom faces for ease of positioning.

### **ASSEMBLY**



SHERPA®-connectors oftheTimber-Series can also be fully housed. The housing depth is depending on the typ and has to be made 1mm shallower than the thickness of the connector.

d = screw diameter



It is recommened to pre-drill the screws for the Timber-Series.



To make the positioningeasier, pre-drill and install the straight screws first then pre-drill and install the inclined screws.

# **Assembly instructions**

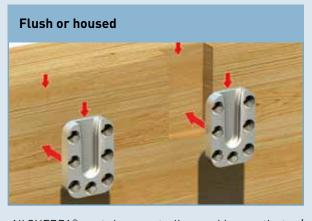
NOTICE:
According to approval Z-9.1-558
SHERPA-special screws
5 x 60 mm have to be used.

SHERPA® S1, S2, S3, S4, S5 (with general construction approval) (a) A1, A3, KA1, KT, K, WTS1 special, WTS1, WTS3 special, WTS5 special, mini 10, mini 17

### **PLACEMENT**

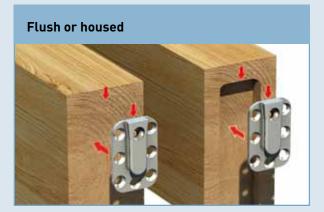
# Screws 5 x 60 mm

The SHERPA-part with the larger amount of holes has to be fastened to the end-grain (secondary beam).



All SHERPA  $^{\! \odot}\!$  -parts have centerline markings on the top/bottom faces for ease of positioning.

### **ASSEMBLY**



SHERPA®-connectors of the S-Series can also be fully housed. The housing depth is depending on the typ and has to be made 1mm shallower than the thickness of the connector.



In stall the straights crews first, then in stall the inclined screws.

Notice (applicable to all SHERPA®-connectors):

All specifications applies to solid sawn timber with a minimum grade of C24 per EN 338:2009 and DIN 1052:2008 (equivalent S10 per DIN 4074-1:2008) and all glulam with a minum grade per EN 1194:1999 or DIN 1052:2008. Solid sawn timber has to have a moisture content of 18% at the time the connection is installed and has to be free of heart (FOHC) for all end-grain applications.

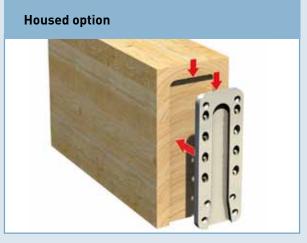
The listed characteristic/design values are only guaranteed if the appropriate SHERPA®-specials crews are used with the respective SHERPA®-connectors. It is recommended to apply a lubricant (spray) on the male and female sides of the connector parts to minimize the friction between the two surface during installation. All sufaces that SHERPA®-connectors are applied to have to plane and smooth. Under circumstances the dimension changes due to swelling and shrinkage of the wood during installation has to be considered.

# **Assembly instructions**

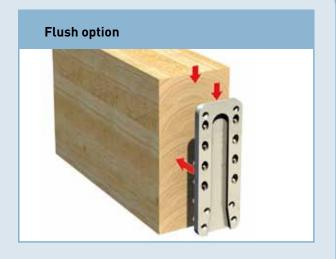
NOTICE: According to approval Z-9.1-788 SHERPA-special screws 8 x 160 mm have to be used.

SHERPA® XL / DXL-Serie XL 55, XL 70, XL 80, XL 100, XL 120, XL 140, XL 190, XL 250, DXL 280

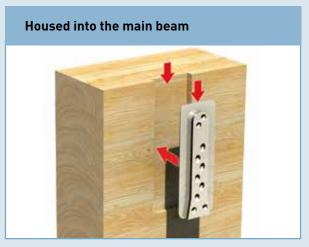
### Assembly on end-grain (secondary beam)



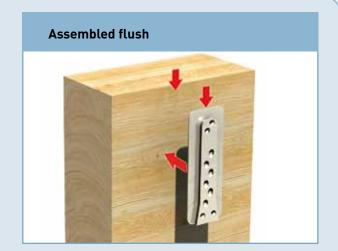
The housing depth for SHERPA® XL/DXL-connectors has to be 3 to 5 mm shallower than the thickness of the connector.



# Assembly on side-grain (main beam)



The housing depth for SHERPA® XL/DXL-connectors has to be 3 to 5 mm shallower than the thickness of the connector.



Under consideration of the appropiate edge distance, the SHERPA-part with the larger amount of holes has to be fastened to the end-grain (secondary beam). The SHERPAXL/DXL-connectors can be mounted either flush or fully housed.

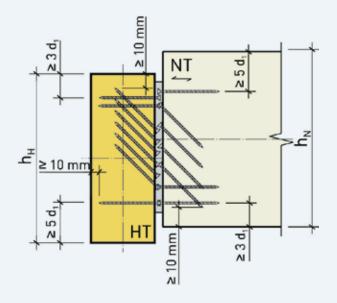
The appropiate self-tapping, fully threaded screws can be installed without pre-drilling the wood. Advice for the screw installation: install the straight screws first to secure and fix the connector in place, then install the inclined screws.

It is recommended to fasten the SHERPA XL/DXL-connectors using a torque wrench with a torque setting of  $M_{\tau}=20$  Nm [14.75 lbft].

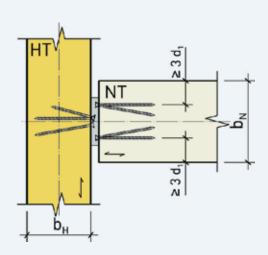
# Minimum edge distances for SHERPA-connectors

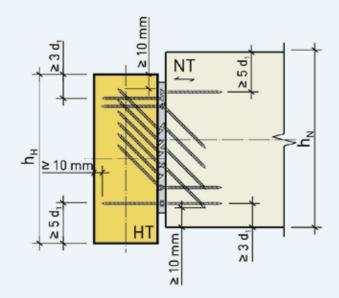
On the following pages the minimum required edge distances for SHERPA-connectors are illustrated. The sketches were created for the SHERPAXL/DXL-connectors and are valid for all SHERPA-Series correspondingly.

Minimum edge distances for a perpendicular Beam (HT) - Joist (HT) - Connection Minimum edge distances for an angled (plan-view) Beam (HT) - Joist (HT) - Connection

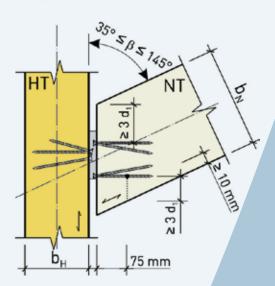


d1 ... Nenndurchmesser der Schraube



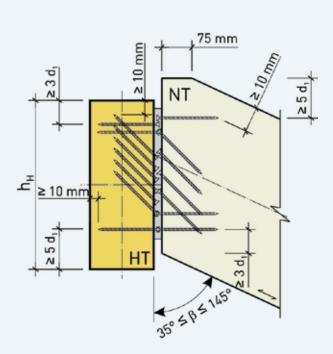


d<sub>1</sub> ... Nenndurchmesser der Schraube

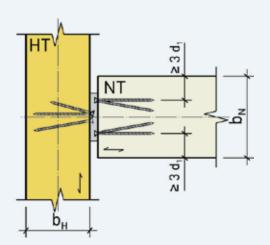


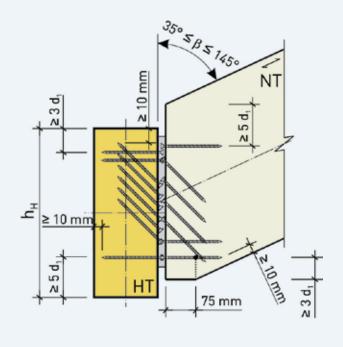
# Minimum edge distances for a declined / inclined (elevation-view) Beam (HT) - Joist (HT) - Connection

.....

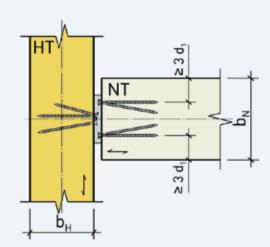


 $d_1 \dots N$ enndurchmesser der Schraube





d<sub>1</sub> ... Nenndurchmesser der Schraube

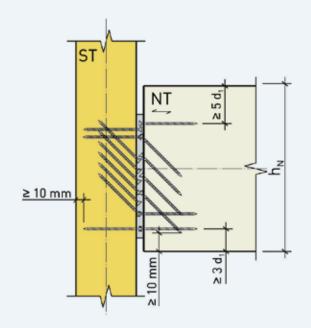


Minimum edge distances for a perpendicular Post/Column (ST) -Joist (HT) - Connection

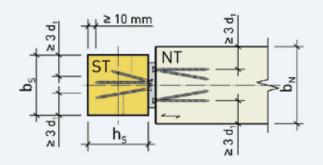
.....

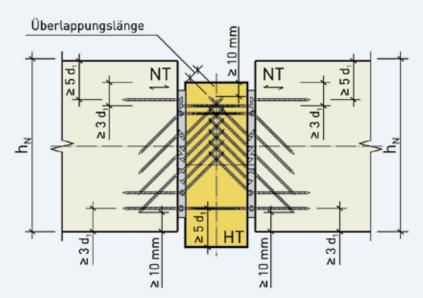
Minimum edge distances for a both sides perpendicular Beam (HT) - Joist (HT) - Connection

.....

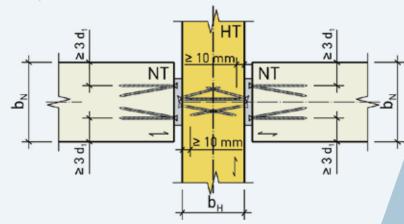


d<sub>1</sub> ... Nenndurchmesser der Schraube





d<sub>1</sub> ... Nenndurchmesser der Schraube



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