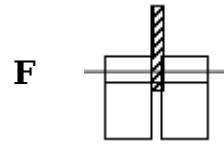


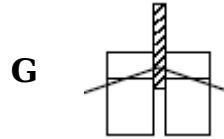
Timber-to-Timber (Panel-to-Timber) Connections (Double Shear)	Failure	Equations	Reference	
	Mode			
	G		$F_{V,RK} = f_{h,1,k} t_1 d$	Equation 1-1
	H		$F_{V,RK} = 0.5 f_{h,2,k} t_2 d$	Equation 1-2
	J		$F_{V,RK} = 1.05 \frac{f_{h,1,k} t_1 d}{2 + \beta} \left[\sqrt{2\beta(1 + \beta) + \frac{4\beta(2 + \beta) M_{y,Rk}}{f_{h,1,k} d t_1^2}} - \beta \right] + \frac{F_{ax,Rk}}{4}$	Equation 1-3
K		$F_{V,RK} = 1.15 \sqrt{\frac{2\beta}{1 + \beta}} \sqrt{2 M_{y,Rk} f_{h,1,k} d} + \frac{F_{ax,Rk}}{4}$	Equation 1-4	

**Steel-to-Timber Connections
- Steel Plate as Centre
Member
(Double Shear)**



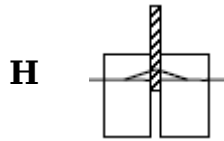
$$F_{v,Rk} = f_{h,1,k} t_1 d$$

Equation 1-5



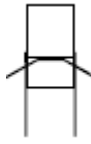
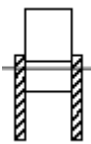
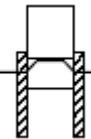
$$F_{v,Rk} = f_{h,1,k} t_1 d \left[\sqrt{2 + \frac{4M_{y,Rk}}{f_{h,1,k} d t_1^2}} - 1 \right] + \frac{F_{ax,Rk}}{4}$$

Equation 1-6



$$F_{v,Rk} = 2.3 \sqrt{M_{y,Rk} f_{h,1,k} d} + \frac{F_{ax,Rk}}{4}$$

Equation 1-7

Steel-to-Timber Connections - Timber as Centre Member (Double Shear)	Thin Steel	K		$F_{v,Rk} = 1.15 \sqrt{2M_{y,Rk} f_{h,2,k} d} + \frac{F_{ax,Rk}}{4}$	Equation 1-8
	Independent of steel thickness	J or L		$F_{v,Rk} = 0.5 f_{h,2,k} t_2 d$	Equation 1-9
	Thick Steel	M		$F_{v,Rk} = 2.3 \sqrt{M_{y,Rk} f_{h,2,k} d} + \frac{F_{ax,Rk}}{4}$	Equation 1-10

Equation 1-3, Equation 1-4, Equation 1-6, Equation 1-7, Equation 1-

8 and Equation 1-10 have another additional term $\frac{F_{ax,Rk}}{4}$ which

takes into account the rope effect. Eurocode 5: Part 1 suggested a maximum value of 25% of the Johansen part of the equations.

Therefore these equations can be simplified as shown below:

$$F_{v,Rk} = 1.25 \left\{ 1.05 \frac{f_{h,1,k} t_1 d}{2 + \beta} \left[\sqrt{2\beta(1 + \beta) + \frac{4\beta(2 + \beta) M_y}{f_{h,1,k} dt_1^2}} \right] \right. \quad \text{Equation 1-3(i)}$$

$$F_{v,Rk} = 1.15 \sqrt{\frac{2\beta}{1 + \beta} \sqrt{2M_{y,Rk} f_{h,1,k} d} + \frac{F_{ax,Rk}}{4}} \quad \text{Equation 1-4(i)}$$

$$F_{v,Rk} = f_{h,1,k} t_1 d \left[\sqrt{2 + \frac{4M_{y,Rk}}{f_{h,1,k} dt_1^2}} - 1 \right] + \frac{F_{ax,Rk}}{4} \quad \text{Equation 1-6(i)}$$

$$F_{v,Rk} = 2.3 \sqrt{M_{y,Rk} f_{h,1,k} d} + \frac{F_{ax,Rk}}{4} \quad \text{Equation 1-7(i)}$$

$$F_{v,Rk} = 1.25 \left\{ 1.15 \sqrt{2M_{y,Rk} f_{h,2,k} d} \right\} \quad \text{Equation 1-8(i)}$$

$$F_{v,Rk} = 1.25 \left\{ 2.3 \sqrt{M_{y,Rk} f_{h,2,k} d} \right\} \quad \text{Equation 1-10(i)}$$