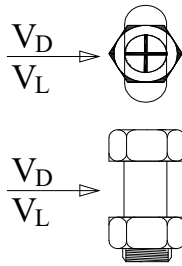


**Design of Slip Critical Connection with Short-Slotted Holes Subjected to Shear Force****Details of Bolt (short slots transverse to the load)**

Grade:	SEL("AISC/ASTM_bolts"; Name; )	=	A325
$F_u$ =	TAB("AISC/ASTM_bolts"; $F_u$ ;Name=Grade)	=	120 ksi
Bolt:	SEL("AISC/J3.1"; Size; )	=	d3/4 A325
Bolt diameter, $d_b$ =	TAB("AISC/J3.1";dia;Size=Bolt)	=	0.7500 in
Area of bolt, $A_b$ =	TAB("AISC/J3.1";Area;Size=Bolt)	=	0.4418 in <sup>4</sup>
Class:	SEL("AISC/Class";class; )	=	Class_A
$T_b$ =	TAB("AISC/J3.1"; $T_b$ ;Size=Bolt)	=	28 kips
$\mu$ =	TAB("AISC/Class2"; mio; cat=Class_sym)	=	0.35

( $T_b$  is the minimum bolt pretension and  $\mu$  is the mean slip coefficient)

$D_u$ =			1.13
Number of slip planes, $n_s$ =			2
hole factor, $h_f$ =			1.00

**Loads**

Shear force due to dead load, $V_D$ =			3.00 kips
Shear force due to live load, $V_L$ =			7.00 kips
From Chapter 2 of ASCE/SEI 7, the required strength is:			
$V_u$ =	$1.2*V_D+1.6*V_L$	=	14.8 kips

**Check for Slip Resistance**

$\Phi$ =			1.00
The design slip resistance, $\Phi R_n$ =	$\Phi * \mu * D_u * h_f * T_b * n_s$	=	22.15 kips
Check_slip=	IF( $\Phi R_n \geq V_u$ ,"Safe"; "Unsafe")	=	Safe

**Check The Limit State of Bolt Shear**

$\Phi_2$ =			0.75
From AISC Specification Table J3.2,			
The available shear strength, $F_{nv}$ =	$0.40*F_u$	=	48.0 ksi
The actual shear stress, $f_{rv}$ =	$V_u / (A_b)$	=	33.5 ksi



Check\_Shear= IF( $\Phi_2 * F_{nv} \geq f_{rv}$ , "Safe"; "Increase  $d_b$ ") = Safe

**Design Summary**

Size=  $d_b$  0.7500 in  
F<sub>u</sub>= TAB("AISC/ASTM\_bolts"; F<sub>u</sub>; Name=Grade) = 120 ksi  
V<sub>u</sub>= 1.2\*V<sub>D</sub>+1.6\*V<sub>L</sub> =14.8 kips  
The design slip resistance,  $\Phi R_n$ =  $\Phi * \mu * D_u * h_f * T_b * n_s$  22.15 kips  
Check\_slip= IF( $\Phi R_n \geq V_u$ , "Safe"; "Unsafe") = Safe  
The available shear stress,  $f_{rv}$ =  $V_u / A_b$  =33.5 ksi  
The available shear strength, F<sub>nv</sub>= 0.40\*F<sub>u</sub> 48.00 ksi  
Check\_Shear= IF( $\Phi_2 * F_{nv} \geq f_{rv}$ , "Safe"; "Increase  $d_b$ ") = Safe