

# TuffLink™ 360 Link Clamp Levers

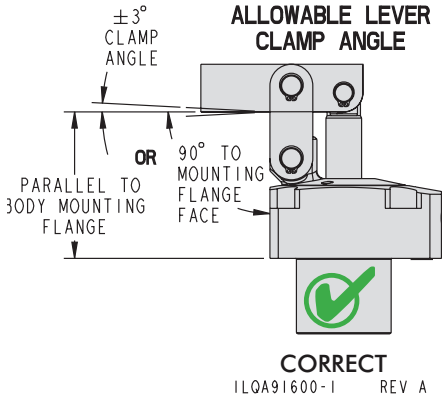
## Link Clamp Lever Frequently Asked Questions

### What is link clamp lever clamp angle?

It is the angle of the clamping lever contact surface measured from the body mounting flange surface to the work piece contact surface of the clamping lever.

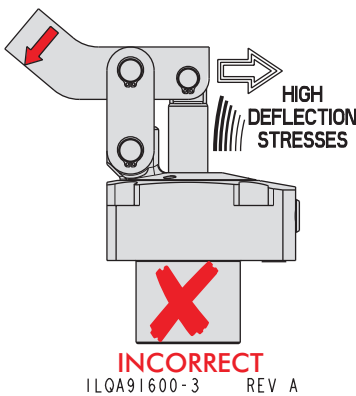
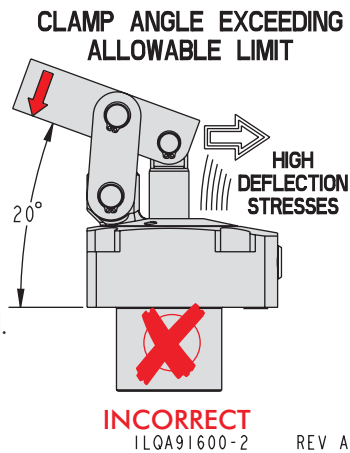
### What is the acceptable lever clamp angle when clamping my work piece?

Levers should be designed and contact bolts should be adjusted so that the lever contact surface is within  $\pm 3^\circ$  of parallel to the body mounting flange or  $90^\circ$  to mounting flange face when clamping a work piece. Use a digital angle finder or angle finder app on your smart phone to measure the angular position of the lever.



### I want to clamp a work piece with my lever at $20^\circ$ from the mount flange, will it cause damage to the linkage mechanism or piston rod?

Yes, a lever angle of  $20^\circ$  will cause excess force on the linkage mechanism and piston rod. Rapid, premature failure will result from excessive bending stresses in the rod. The lever must be positioned within the acceptable angle discussed above.



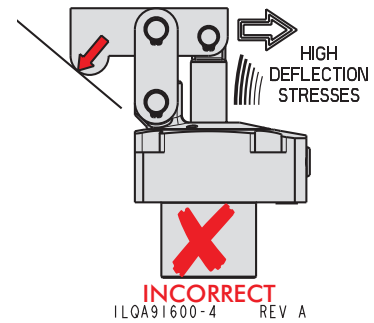
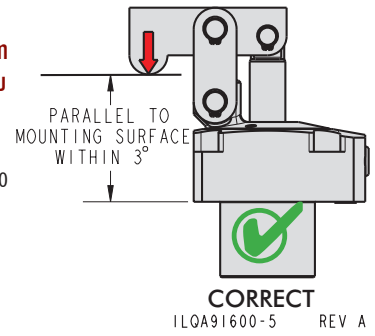
I've designed my own custom lever with the work piece contact surface at an angle to the clamp mounting flange. The lever shape also makes it parallel to the clamp mounting surface where it pins to the clamp linkage and plunger. Is it safe to use this lever?

No, it is not safe to use the lever shown below. Even though the shape of the lever has a portion that is parallel

to the clamp mounting flange, the work piece contact surface is not parallel to the mounting flange. When clamping, the reaction force will put a force vector into the piston rod causing excessive bending stress and deflection. The work piece contact surface must be parallel to the body mounting flange within  $\pm 3^\circ$ .

### I want to use a radius contact point on the end of my custom lever, what guidelines can you give me?

Position the clamp so that its mounting flange is parallel to the work piece contact surface within  $\pm 3^\circ$ . Positioning the clamp so that the mounting flange is at an angle greater than  $3^\circ$  to the work piece contact surface will cause excessive bending stresses to the rod resulting in premature failure.



### I want to use an extended length lever, will I need to pressure reduce my link clamp similar to pressure reducing a swing clamp when using a long arm?

No, link clamps are opposite of swing clamps when it comes to long arms. Link clamps can be operated at maximum operating pressure when extended levers are used. Assuming constant clamp pressure; increasing the distance between the contact point and link pivot or fulcrum creates less clamping force and less internal stresses in the linkage and pins. Reducing the distance between the contact point and link pivot produces greater clamping force and increased internal stresses in the linkage and pins. Therefore, if a shorter than standard length lever is used, the link clamp must be pressure reduced to avoid damage to the linkage mechanism. See the clamping force tables and graphs for the allowable lever length and operating pressure combinations.

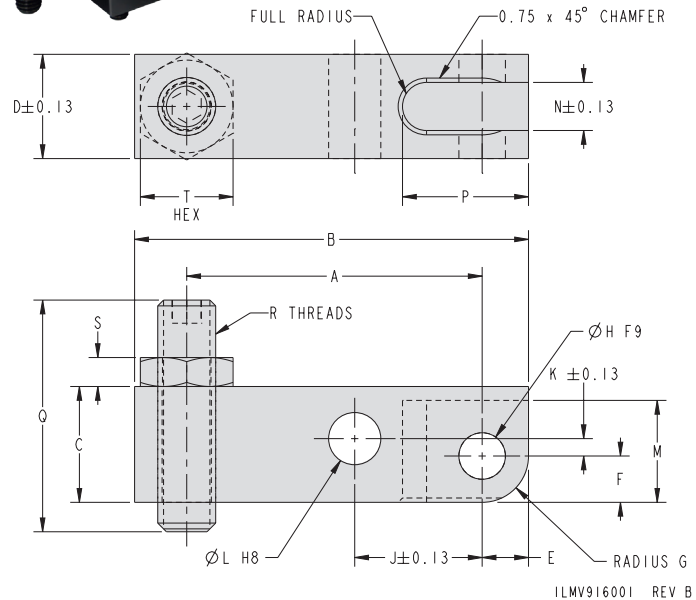


# TuffLink™ 360 Link Clamp Levers

## Link Clamp Lever Dimensions



**NOTE:** Levers for both Double Acting and Single Acting TuffLink 360 Link Clamps.



ILMV916001 REV B

### Dimensions

Model No.	A	B	C	D	E	F	G	H	J	K
<b>Standard Lever</b>										
91-6112-03	35.0	46	14	12	5	5	5	5	15	3
91-6115-03	41.5	54.5	18	14	6	6	6	6	18	5
91-6118-03	51.0	68	20	18	8	8	8	8	22	3
91-6122-03	59.0	80	25	22	10	10	10	10	26.5	4
91-6128-03	72.0	97	30	26	12	12	12	12	32	5
91-6132-03	86.5	116.5	36	32	14	14	14	14	40	6
<b>Extended Blank</b>										
91-6112-02	N/A	66	14	12	5	5	5	5	15	3
91-6115-02	N/A	78	18	14	6	6	6	6	18	5
91-6118-02	N/A	97	20	18	8	8	8	8	22	3
91-6122-02	N/A	112.5	25	22	10	10	10	10	26.5	4
91-6128-02	N/A	137	30	26	12	12	12	12	32	5
91-6132-02	N/A	163	36	32	14	14	14	14	40	6
Model No.	L	M	N	P	Q	R	S	T		
<b>Standard Lever</b>										
91-6112-03	6	11	5.3	13.65	25	M6 X 1	3.2	10		
91-6115-03	7	13.2	6.3	16.35	35	M8 X 1.25	4	13		
91-6118-03	9	17.6	8.3	21.75	40	M10 X 1.5	5	16		
91-6122-03	11	22	10.3	27.15	50	M12 X 1.75	6	18		
91-6128-03	13	26.4	12.3	32.55	60	M16 X 2.0	8	24		
91-6132-03	16	30.8	14.3	37.95	80	M20 X 2.5	10	30		
<b>Extended Blank</b>										
91-6112-02	6	11	5.3	13.65	N/A	N/A	N/A	N/A		
91-6115-02	7	13.2	6.3	16.35	N/A	N/A	N/A	N/A		
91-6118-02	9	17.6	8.3	21.75	N/A	N/A	N/A	N/A		
91-6122-02	11	22	10.3	27.15	N/A	N/A	N/A	N/A		
91-6128-02	13	26.4	12.3	32.55	N/A	N/A	N/A	N/A		
91-6132-02	16	30.8	14.3	37.95	N/A	N/A	N/A	N/A		

# TuffLink™ 360 Link Clamp Levers



## Clamping Force Tables

**NOTE:** For both Double Acting™ and Single Acting TuffLink™ 360 Link Clamps.

41-6X12-00										
Operating Pressure (bar)	Cylinder Force (kN)	Clamping Force (kN)								Min Lever Length "L" (mm)
		Lever Length "L" (mm)								
		24	30	35	40	50	61	80	100	
350	4.0			2.7	2.2	1.6	1.2	0.8	0.6	35
315	3.6			2.5	2.0	1.4	1.1	0.8	0.6	31
280	3.2		2.9	2.2	1.7	1.2	1.0	0.7	0.5	28
245	2.8		2.5	1.9	1.5	1.1	0.8	0.6	0.4	25
210	2.4	3.6	2.2	1.6	1.3	0.9	0.7	0.5	0.4	24
175	2.0	3.0	1.8	1.4	1.1	0.8	0.6	0.4	0.3	24
140	1.6	2.4	1.5	1.1	0.9	0.6	0.5	0.3	0.3	24
105	1.2	1.8	1.1	0.8	0.7	0.5	0.4	0.3	0.2	24
70	0.8	1.2	0.7	0.5	0.4	0.3	0.2	0.2	0.1	24
35	0.4	0.6	0.4	0.3	0.2	0.2	0.1	0.1	0.1	24
Max Op. Pressure (bar)		229	307	350	350	350	350	350	350	

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41-6X15-00										
Operating Pressure (bar)	Cylinder Force (kN)	Clamping Force (kN)								Min Lever Length "L" (mm)
		Lever Length "L" (mm)								
		29	35	41.5	50	60	72	90	120	
350	6.2			4.4	3.2	2.4	1.9	1.4	1.0	41.5
315	5.6			3.9	2.9	2.2	1.7	1.3	0.9	37
280	4.9		4.8	3.5	2.6	2.0	1.5	1.1	0.8	33
245	4.3		4.2	3.1	2.2	1.7	1.3	1.0	0.7	30
210	3.7	5.6	3.6	2.6	1.9	1.5	1.1	0.9	0.6	29
175	3.1	4.7	3.0	2.2	1.6	1.2	0.9	0.7	0.5	29
140	2.5	3.7	2.4	1.7	1.3	1.0	0.8	0.6	0.4	29
105	1.9	2.8	1.8	1.3	1.0	0.7	0.6	0.4	0.3	29
70	1.2	1.9	1.2	0.9	0.6	0.5	0.4	0.3	0.2	29
35	0.6	0.9	0.6	0.4	0.3	0.2	0.2	0.1	0.1	29
Max Op. Pressure (bar)		234	300	350	350	350	350	350	350	

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41-6X18-00										
Operating Pressure (bar)	Cylinder Force (kN)	Clamping Force (kN)								Min Lever Length "L" (mm)
		Lever Length "L" (mm)								
		36	42	51	60	75	89	115	140	
350	8.9			6.2	4.7	3.4	2.7	1.9	1.5	51
315	8.0			5.6	4.3	3.1	2.4	1.7	1.4	46
280	7.1		7.2	5.0	3.8	2.7	2.2	1.6	1.2	41
245	6.2		6.3	4.4	3.3	2.4	1.9	1.4	1.1	37
210	5.3	7.7	5.4	3.7	2.8	2.0	1.6	1.2	0.9	36
175	4.5	6.4	4.5	3.1	2.4	1.7	1.3	1.0	0.8	36
140	3.6	5.2	3.6	2.5	1.9	1.4	1.1	0.8	0.6	36
105	2.7	3.9	2.7	1.9	1.4	1.0	0.8	0.6	0.5	36
70	1.8	2.6	1.8	1.2	0.9	0.7	0.5	0.4	0.3	36
35	0.9	1.3	0.9	0.6	0.5	0.3	0.3	0.2	0.2	36
Max Op. Pressure (bar)		239	293	350	350	350	350	350	350	

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41-6X22-00										
Operating Pressure (bar)	Cylinder Force (kN)	Clamping Force (kN)								Min Lever Length "L" (mm)
		Lever Length "L" (mm)								
		43.5	50	59	70	90	102.5	125	150	
350	13.9			10.4	7.8	5.3	4.5	3.4	2.7	59
315	12.5			9.4	7.0	4.8	4.0	3.1	2.5	53
280	11.1		11.5	8.4	6.2	4.3	3.6	2.8	2.2	48
245	9.7	14.0	10.1	7.3	5.5	3.7	3.1	2.4	1.9	43.5
210	8.3	12.0	8.7	6.3	4.7	3.2	2.7	2.1	1.6	43.5
175	7.0	10.0	7.2	5.2	3.9	2.7	2.2	1.7	1.4	43.5
140	5.6	8.0	5.8	4.2	3.1	2.1	1.8	1.4	1.1	43.5
105	4.2	6.0	4.3	3.1	2.3	1.6	1.3	1.0	0.8	43.5
70	2.8	4.0	2.9	2.1	1.6	1.1	0.9	0.7	0.5	43.5
65	1.4	2.0	1.4	1.0	0.8	0.5	0.4	0.3	0.3	43.5
Max Op. Pressure (bar)		248	298	350	350	350	350	350	350	

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41-6X28-00										
Operating Pressure (bar)	Cylinder Force (kN)	Clamping Force (kN)								Min Lever Length "L" (mm)
		Lever Length "L" (mm)								
		53	60	72	85	105	125	140	160	
350	21.6			15.9	12.0	8.7	6.8	5.9	5.0	72
315	19.4			14.3	10.8	7.8	6.1	5.3	4.5	64
280	17.2		18.1	12.7	9.6	7.0	5.5	4.7	4.0	58
245	15.1	21.1	15.9	11.1	8.4	6.1	4.8	4.1	3.5	53
210	12.9	18.1	13.6	9.5	7.2	5.2	4.1	3.5	3.0	53
175	10.8	15.1	11.3	7.9	6.0	4.3	3.4	2.9	2.5	53
140	8.6	12.1	9.1	6.3	4.8	3.5	2.7	2.3	2.0	53
105	6.5	9.1	6.8	4.8	3.6	2.6	2.0	1.8	1.5	53
70	4.3	6.0	4.5	3.2	2.4	1.7	1.4	1.2	1.0	53
35	2.2	3.0	2.3	1.6	1.2	0.9	0.7	0.6	0.5	53
Max Op. Pressure (bar)		249	294	350	350	350	350	350	350	

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41-6X32-00										
Operating Pressure (bar)	Cylinder Force (kN)	Clamping Force (kN)								Min Lever Length "L" (mm)
		Lever Length "L" (mm)								
		66	75	86.5	100	115	130	149	170	
350	28.1			22.3	17.3	13.8	11.5	9.5	8.0	86.5
315	25.3			20.0	15.5	12.4	10.4	8.6	7.2	78
280	22.5		23.7	17.8	13.8	11.0	9.2	7.6	6.4	71
245	19.7	27.9	20.7	15.6	12.1	9.7	8.1	6.7	5.6	66
210	16.9	23.9	17.8	13.4	10.4	8.3	6.9	5.7	4.8	66
175	14.1	19.9	14.8	11.1	8.6	6.9	5.8	4.8	4.0	66
140	11.3	15.9	11.8	8.9	6.9	5.5	4.6	3.8	3.2	66
105	8.4	12.0	8.9	6.7	5.2	4.1	3.5	2.9	2.4	66
70	5.6	8.0	5.9	4.5	3.5	2.8	2.3	1.9	1.6	66
35	2.8	4.0	3.0	2.2	1.7	1.4	1.2	1.0	0.8	66
Max Op. Pressure (bar)		256	303	350	350	350	350	350	350	

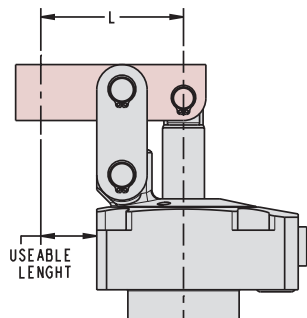
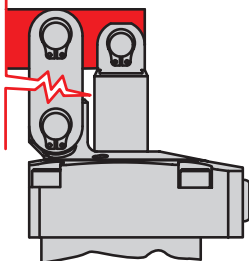
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Indicates Non-Usable Range

P-3

← Minimum Lever Length

Using lever shorter than minimum lever length will produce large clamping forces leading to premature failure of link plates or pins.



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41-6X12-00										
Operating Pressure (bar)	Cylinder Force (kN)	Clamping Force (kN)								Min Lever Length "L" (mm)
		Lever Length "L" (mm)								
		24	30	35	40	50	61	80	100	
350	4.0			2.7	2.2	1.6	1.2	0.8	0.6	35
315	3.6			2.5	2.0	1.4	1.1	0.8	0.6	31
280	3.2		2.9	2.2	1.7	1.2	1.0	0.7	0.5	28
245	2.8		2.5	1.9	1.5	1.1	0.8	0.6	0.4	25
210	2.4	3.6	2.2	1.6	1.3	0.9	0.7	0.5	0.4	24
175	2.0	3.0	1.8	1.4	1.1	0.8	0.6	0.4	0.3	24
140	1.6	2.4	1.5	1.1	0.9	0.6	0.5	0.3	0.3	24
105	1.2	1.8	1.1	0.8	0.7	0.5	0.4	0.3	0.2	24
70	0.8	1.2	0.7	0.5	0.4	0.3	0.2	0.1	0.1	24
35	0.4	0.6	0.4	0.3	0.2	0.2	0.1	0.1	0.1	24
Max Op. Pressure (bar)		229	307	350	350	350	350	350	350	

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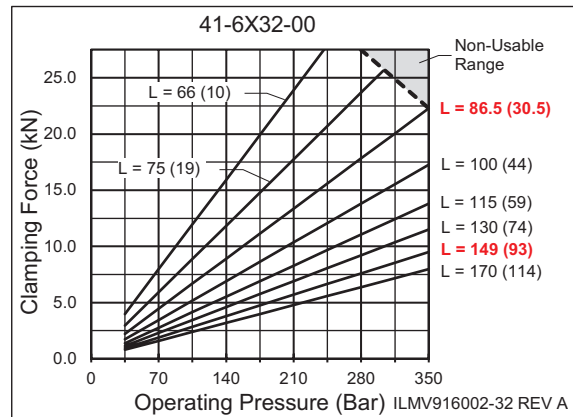
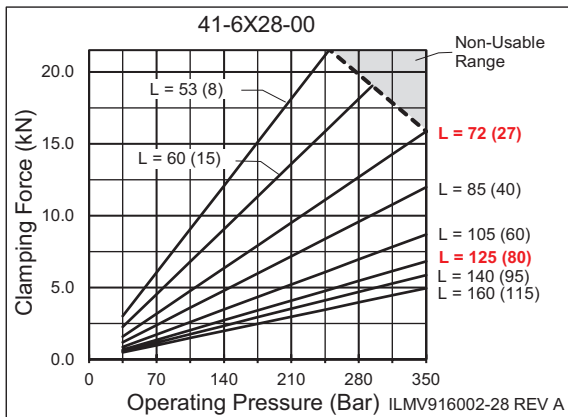
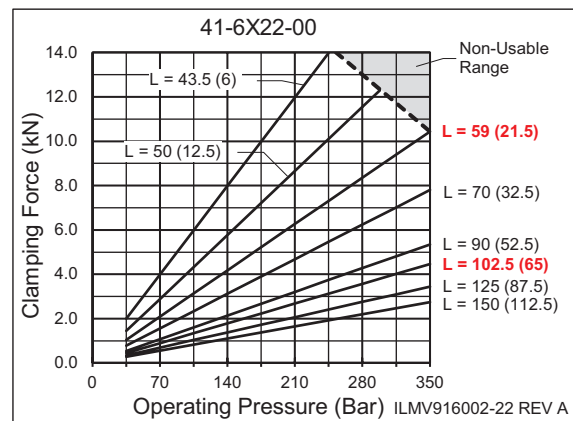
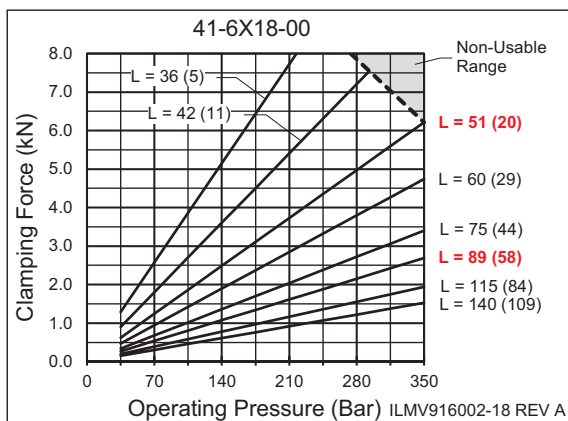
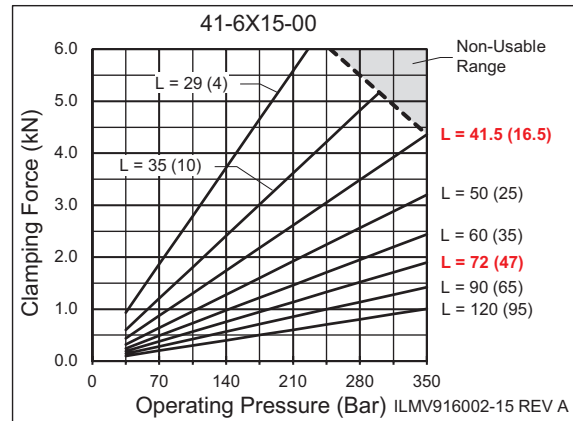
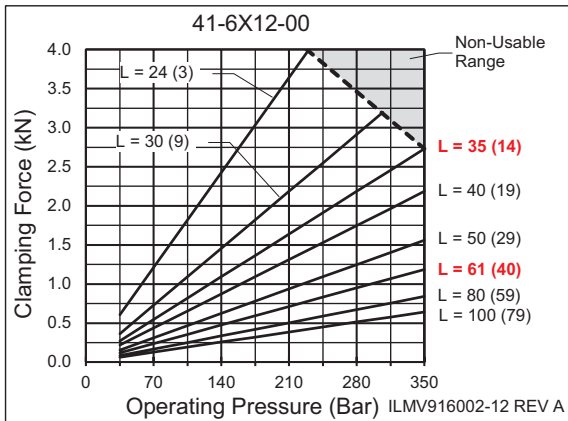
### How to Use the Clamping Force Tables

- 1) Start by choosing the lever length you need for your application.
- 2) Then move along the line and select the clamping force and operating pressure or operating pressure and clamping force needed.

Example: Using a 41-6212-00 with a 35 mm lever (14 mm usable length); the clamping force would be 2.2 kN at 280 Bar.

# TuffLink™ 360 Link Clamp Levers

## Clamping Force Graphs



- The tables and graphs show the relationship between lever length, operating pressure and clamping force.
- The lever lengths shown in red are Vektex's available levers for purchase.
- The lever lengths shown in parenthesis are the usable length from the edge of the clamp body to the contact bolt.
- Tables include maximum operating pressure associated with the arm length shown in the header rows of the table.
- The column on the right of the table is the minimum lever length allowed at the associated operating pressure.
- Operating the clamp in the non-usable range will damage the clamp and void product warranty.

### How to Use the Clamping Force Graphs

- 1) Start by choosing the lever length you need for your application.
- 2) Then move along the line and select the clamping force and operating pressure or operating pressure and clamping force needed.

Example: Using a 41-6212-00 with a 35 mm lever (14 mm usable length); the clamping force would be 2.2 kN at 280 Bar.

