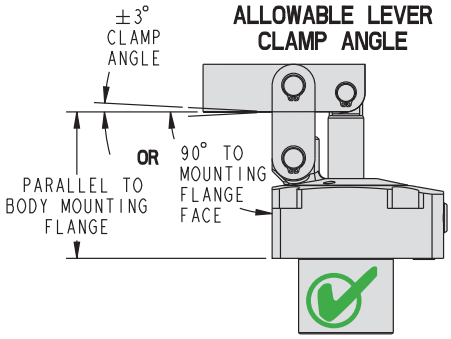
Frequently Asked Questions

What is the link clamp lever clamp angle?

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

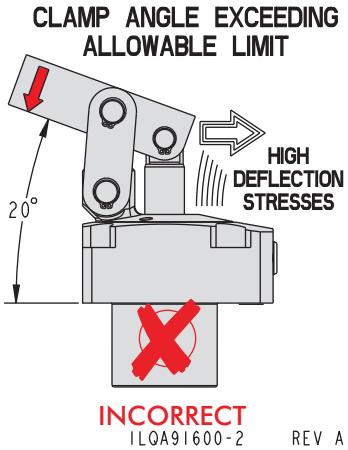
What is the acceptable lever clamp angle when clamping my workpiece?

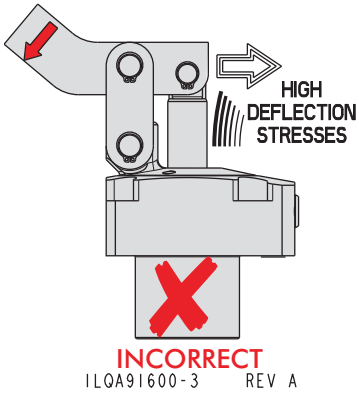
Levers should be designed and contact bolts should be adjusted so that the lever contact surface is within ±3° of parallel to the body mounting flange or 90° to mounting flange face when clamping a workpiece. Use a digital angle finder or angle finder app on your smart phone to measure the angular position of the lever. It should be parallel to the body mounting flange or 90° to mounting flange face within ±3°.



I want to clamp a workpiece with my lever at 20° from the mount flange, will it cause damage to the linkage mechanism or piston rod?

Yes, a lever angle of greater than ±3° of parallel to the body mounting flange 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 in the second question.



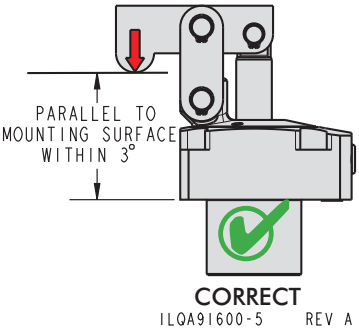


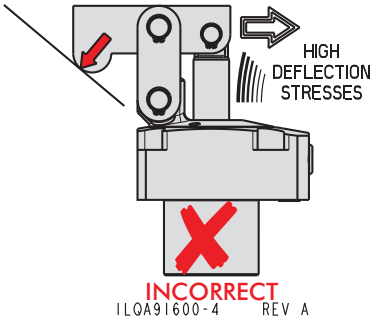
I've designed my own custom lever with the workpiece contact surface at an angle to the clamp mounting flange. The lever shape also makes it parallel to the clamp mounting surface where it pins to the clamp linkage and plunger. Is it safe to use this lever?

No, it is not safe to use the lever shown. Even though the shape of the lever has a portion that is parallel to the clamp mounting flange, the workpiece 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 workpiece contact surface must be parallel to the body mounting flange within +/-3°.

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 it's mounting flange is parallel to the workpiece contact surface within ±3°. Positioning the clamp so that the mounting flange is at an angle greater than 3° to the workpiece contact surface will cause excessive bending stresses to the rod resulting in premature failure.





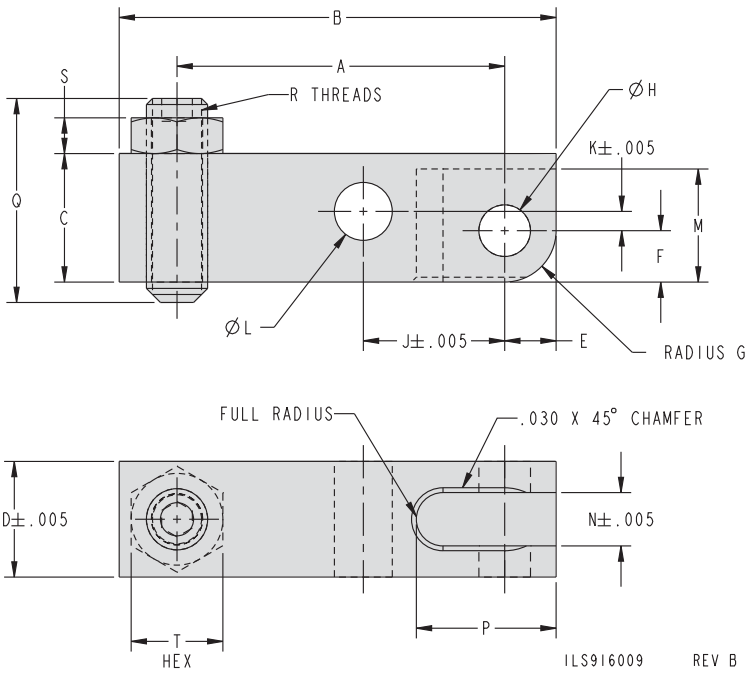
I want to use an extended length lever, will I need to pressure reduce my link clamp similar to pressure reducing a swing clamp when using a long arm?

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.

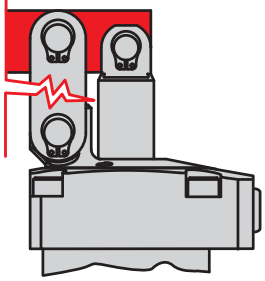
TuffLink™ 360

VEKTEK

TuffLink™ 360° Levers



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



Dimensions

Model No.	A	B	C	D	E	F	G	H Max	H Min	J	K	L Max	L Min	M	N	P	Q	R	S	T
Standard Length Lever																				
91-6112-01	1.38	1.81	0.551	0.472	0.197	0.197	0.197	0.1984	0.1972	0.591	0.118	0.2369	0.2362	0.433	0.209	0.54	1.00	1/4-20 UNC	0.156	0.437
91-6115-01	1.63	2.15	0.709	0.551	0.236	0.236	0.236	0.2378	0.2366	0.709	0.197	0.2765	0.2756	0.520	0.248	0.64	1.25	5/16-18 UNC	0.187	0.500
91-6118-01	2.01	2.68	0.787	0.709	0.315	0.315	0.315	0.3169	0.3155	0.866	0.118	0.3552	0.3543	0.693	0.327	0.86	1.25	3/8-16 UNC	0.219	0.562
91-6122-01	2.32	3.15	0.984	0.866	0.394	0.394	0.394	0.3956	0.3942	1.043	0.157	0.4341	0.4331	0.866	0.406	1.07	1.50	1/2-13 UNC	0.312	0.750
91-6128-01	2.83	3.82	1.181	1.024	0.472	0.472	0.472	0.4748	0.4731	1.260	0.197	0.5129	0.5118	1.039	0.484	1.28	2.00	5/8-11 UNC	0.375	0.937
91-6132-01	3.41	4.59	1.417	1.260	0.551	0.551	0.551	0.5535	0.5518	1.575	0.236	0.6310	0.6299	1.213	0.563	1.49	2.00	3/4-10 UNC	0.422	1.125
Extended Length Lever																				
91-6112-02	N/A	2.60	0.551	0.472	0.197	0.197	0.197	0.1984	0.1972	0.591	0.118	0.2369	0.2362	0.433	0.209	0.54	N/A	N/A	N/A	N/A
91-6115-02	N/A	3.07	0.709	0.551	0.236	0.236	0.236	0.2378	0.2366	0.709	0.197	0.2765	0.2756	0.520	0.248	0.64	N/A	N/A	N/A	N/A
91-6118-02	N/A	3.82	0.787	0.709	0.315	0.315	0.315	0.3169	0.3155	0.866	0.118	0.3552	0.354.	0.693	0.327	0.86	N/A	N/A	N/A	N/A
91-6122-02	N/A	4.43	0.984	0.866	0.394	0.394	0.394	0.3956	0.3942	1.043	0.157	0.4341	0.4331	0.866	0.406	1.07	N/A	N/A	N/A	N/A
91-6128-02	N/A	5.39	1.181	1.024	0.472	0.472	0.472	0.4748	0.4731	1.260	0.197	0.5129	0.5118	1.039	0.484	1.28	N/A	N/A	N/A	N/A
91-6132-02	N/A	6.42	1.417	1.260	0.551	0.551	0.551	0.5535	0.5518	1.575	0.236	0.6310	0.6299	1.213	0.563	1.49	N/A	N/A	N/A	N/A

NOTE: Levers are for both Single and Double Acting TuffLink™ 360° clamps.

Clamping Force Tables

16-3X12-00

Operating Pressure (psi)	Cylinder Force (lb)	Clamping Force (lb) Lever Length "L" (in)								Min Lever Length "L" (in)
		0.94	1.19	1.38	1.63	2.00	2.40	3.25	4.00	
5000	877			603	458	338	263	179	140	1.36
4500	789			543	412	304	237	161	126	1.20
4000	701		636	483	367	270	211	143	112	1.08
3500	614		556	422	321	237	184	125	98	0.98
3000	526	818	477	362	275	203	158	107	84	0.94
2500	438	681	397	302	229	169	132	90	70	0.94
2000	351	545	318	241	183	135	105	72	56	0.94
1500	263	409	238	181	137	101	79	54	42	0.94
1000	175	273	159	121	92	68	53	36	28	0.94
500	88	136	79	60	46	34	26	18	14	0.94
Max Op. Pressure (psi)		3300	4480	5000	5000	5000	5000	5000	5000	

ILS916010-12 REV B

16-3X15-00

Operating Pressure (psi)	Cylinder Force (lb)	Clamping Force (lb) Lever Length "L" (in)								Min Lever Length "L" (in)
		1.13	1.38	1.63	2.00	2.38	2.83	3.75	5.00	
5000	1370			969	691	534	421	294	208	1.61
4500	1233			872	622	481	379	264	187	1.43
4000	1096		1064	775	553	427	337	235	166	1.28
3500	959		931	678	484	374	295	206	146	1.17
3000	822	1272	798	581	415	321	253	176	125	1.13
2500	685	1060	665	485	346	267	210	147	104	1.13
2000	548	848	532	366	277	214	168	117	83	1.13
1500	411	636	399	291	207	160	126	88	62	1.13
1000	274	424	266	194	138	107	84	59	42	1.13
500	137	212	133	97	69	53	42	29	21	1.13
Max Op. Pressure (psi)		3340	4360	5000	5000	5000	5000	5000	5000	

ILS916010-15 REV B

16-3X18-00

Operating Pressure (psi)	Cylinder Force (lb)	Clamping Force (lb) Lever Length "L" (in)								Min Lever Length "L" (in)
		1.44	1.75	2.01	2.50	3.00	3.50	4.50	5.50	
5000	1972			1374	962	736	597	432	339	1.97
4500	1775		1600	1236	866	663	537	389	305	1.75
4000	1578		1422	1099	769	589	477	346	271	1.57
3500	1380	1917	1245	962	673	516	418	303	237	1.44
3000	1183	1643	1067	824	577	442	358	259	203	1.44
2500	986	1369	889	687	481	368	298	216	170	1.44
2000	789	1095	711	550	385	295	239	173	136	1.44
1500	502	822	533	412	289	221	179	130	102	1.44
1000	394	548	356	275	192	147	119	86	68	1.44
500	197	274	178	137	96	74	60	43	34	1.44
Max Op. Pressure (psi)		3550	4500	5000	5000	5000	5000	5000	5000	

ILS916010-18 REV B

16-3X22-00

Operating Pressure (psi)	Cylinder Force (lb)	Clamping Force (lb) Lever Length "L" (in)							Min Lever Length "L" (in)
		1.75	2.00	2.32	2.75	3.50	4.04	5.00	6.00	
5000	3081			2317	1733	1204	967	748	597	2.29
4500	2773			2085	1560	1084	888	673	537	2.04
4000	2465		2473	1853	1386	963	790	598	477	1.85
3500	2157	2930	2164	1622	1213	843	691	523	418	1.75
3000	1849	2511	1855	1390	1040	722	592	449	358	1.75
2500	1541	2093	1546	1158	867	602	493	374	298	1.75
2000	1233	1674	1237	927	693	482	395	299	239	1.75
1500	924	1256	927	695	520	361	296	224	179	1.75
1000	616	837	618	463	347	241	197	150	119	1.75
500	308	419	309	232	173	120	99	75	60	1.75
Max Op. Pressure (psi)		3720	4400	5000	5000	5000	5000	5000	5000	

ILS916010-22 REV B

16-3X28-00

Operating Pressure (psi)	Cylinder Force (lb)	Clamping Force (lb) Lever Length "L" (in)								Min Lever Length "L" (in)
		2.09	2.38	2.83	3.38	4.00	4.92	5.50	6.25	
5000	4772			3523	2609	2019	1511	1304	1108	2.79
4500	4295			3170	2348	1817	1360	1174	998	2.49
4000	3818		3950	2818	2087	1615	1209	1044	887	2.25
3500	3340	4664	3456	2466	1826	1413	1058	913	776	2.09
3000	2863	3998	2963	2114	1565	1211	907	783	665	2.09
2500	2386	3331	2469	1761	1304	1009	756	652	554	2.09
2000	1909	2665	1975	1409	1044	807	604	522	443	2.09
1500	1432	1999	1481	1057	783	606	453	391	333	2.09
1000	954	1333	988	705	522	404	302	261	222	2.09
500	477	666	494	352	261	202	151	130	111	2.09
Max Op. Pressure (psi)		3620	4300	5000	5000	5000	5000	5000	5000	

ILS916010-28 REV B

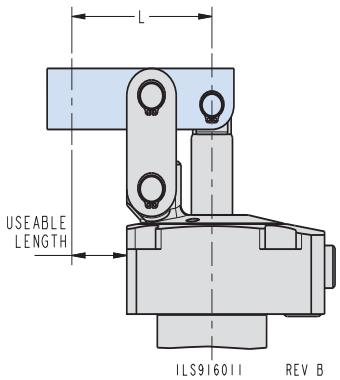
16-3X32-00

Operating Pressure (psi)	Cylinder Force (lb)	Clamping Force (lb) Lever Length "L" (in)								Min Lever Length "L" (in)
		2.63	3.0	3.41	4.00	4.50	5.00	5.87	6.50	
5000	6233			4921	3724	3087	2636	2102	1834	3.35
4500	5610			4429	3351	2778	2373	1892	1650	3.01
4000	4986		5069	3937	2979	2470	2109	1682	1467	2.74
3500	4363	5991	4435	3444	2606	2161	1846	1472	1283	2.63
3000	3740	5135	3802	2952	2234	1852	1582	1261	1100	2.63
2500	3116	4279	3168	2460	1862	1544	1318	1051	917	2.63
2000	2493	3423	2534	1968	1489	1235	1055	841	733	2.63
1500	1870	2567	1901	1476	1117	926	791	631	550	2.63
1000	1247	1712	1267	984	745	617	527	420	367	2.63
500	623	856	634	492	372	309	264	210	183	2.63
Max Op. Pressure (psi)		3620	4300	5000	5000	5000	5000	5000	5000	

ILS916010-32 REV B

Indicates Non-Usable Range

- The tables and graphs show the relationship between lever length, operating pressure and clamping force.
- 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.



ILS916011 REV B

16-3X12-00

Operating Pressure (psi)	Cylinder Force (lb)	Clamping Force (lb) Lever Length "L" (in)								Min Lever Length "L" (in)
		0.94	1.19	1.38	1.63	2.00	2.40	3.25	4.00	
5000	877			603	458	338	263	179	140	1.35
4500	789			543	412	304	237	161	126	1.20
4000	701		636	483	367	270	211	143	112	1.08
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2000	351	545	318	241	183	135	105	72	56	0.94
1500	263	409	238	181	137	101	79	54	42	0.94
1000	175	273	159	121	92	68	53	36	28	0.94
500	88	136	79	60	46	34	26	18	14	0.94
Max Op. Pressure (psi)		3300	4480	5000	5000	5000	5000	5000	5000	

ILS916012 REV B

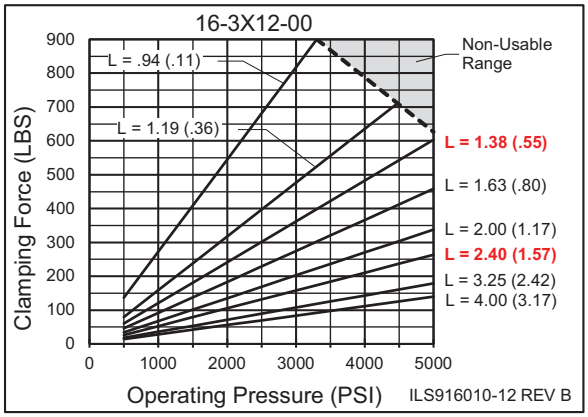
How to Use the Clamping Force Tables

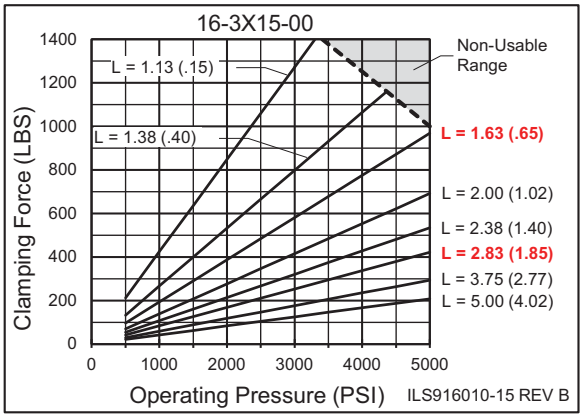
1) Start by choosing the lever length you need for your application.
2) Then move along the line and select the clamping force and operating pressure or operating pressure and clamping force needed.

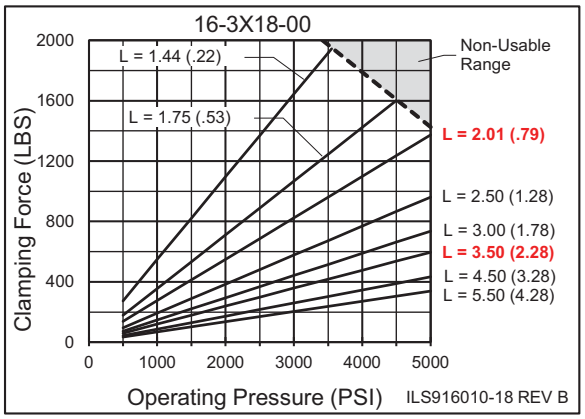
Example: Using a 16-3212-00 with a 1.38 in. lever; the clamping force would be 483 at 4000 psi.

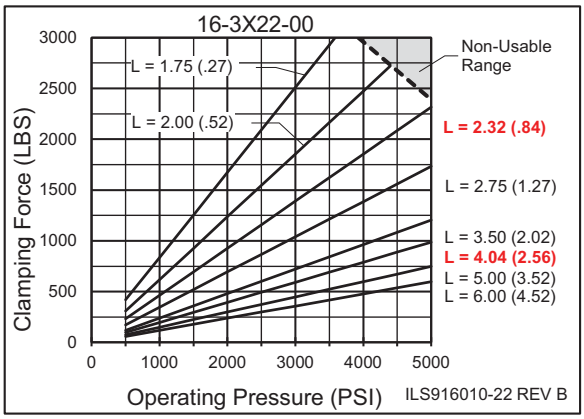
TuffLink™ 360° Levers

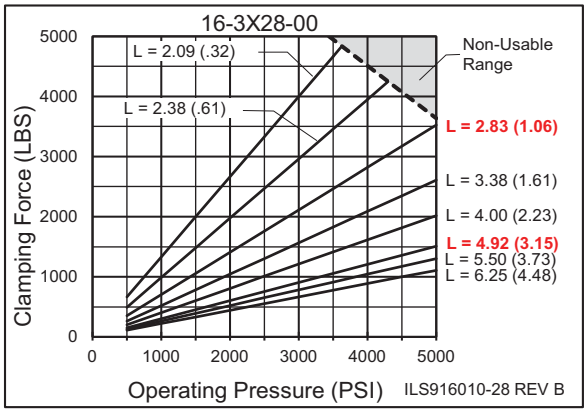
Clamping Force Graphs

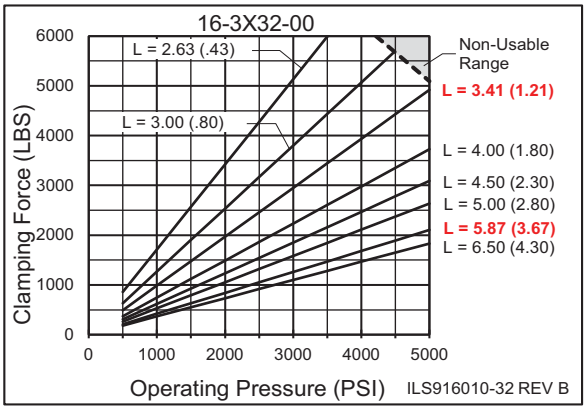


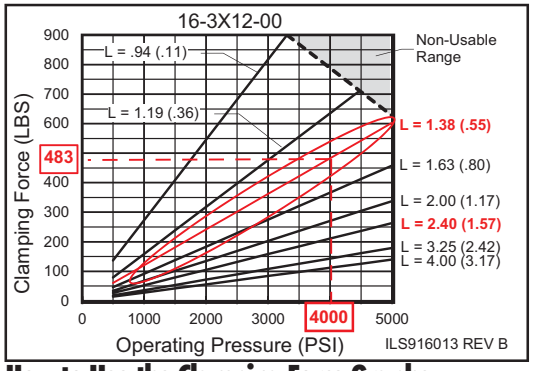












How to Use the Clamping Force Graphs

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 16-3212-00 with a 1.38 in. lever; the clamping force would be 483 at 4000 psi.

- The tables and graphs show the relationship between lever length, operating pressure and clamping force.
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