LARZEP HYDRAULIC

INSTRUCTIONS & MAINTENANCE SHEET

LAS - SQUARE DRIVE HYDRAULIC TORQUE WRENCHES

LAS01, LAS02, LAS04, LAS07, LAS10, LAS15, LAS26, LAS34, LAS48, LAS72

DECLARATION OF CONFORMITY

DECLARACION DE CONFORMIDAD

E

LARZEP, S.A.
Dirección: Avda. Urtiaga, 6
48269 Mallabia ESPAÑA
Declaramos bajo nuestra exclusiva responsabilidad la conformidad de los productos a los que refiere esta declaración, con las disposiciones de la directiva:
2006/42/CE

DECLARATION DE CONFORMITE

F

Nous, LARZEP, S.A.
Adresse: Avda. Urtiaga, 6
48269 Mallabia SPAIN
Déclarons sous notre seule responsabilité que les produits auxqueis se réfère cette déclration sont conformes aux dispositions des Directives:
2006/42/EC

DECLARAÇÁO DE CONFORMIDADE

P

Nós, LARZEP, S.A.
Endereço: Avda. Urtiaga, 6
48269 Mallabia SPAIN
Declaramos, sob nossa única responsabilidade, que os seguintes produtos, incluídos nesta declaração estão em conformidade com o disposto na Directiva:
2006/42/EC

ÖVERENSSTEMMELSESERKLÆRING

DK

Vi, LARZEP, S.A.
Adresse: Avda. Urtiaga, 6
48269 Mallabia SPAIN
Erklærer på eget ansvar, at følgende produkter som er omfattet af denne erklæringen, er i overensstemmelse med bestemmelsene i Direktiv:
2006/42/EC

ERKLÆRINGOM OVERENSSTEMMELSE

N

Vi, LARZEP, S.A.
Adresse: Avda. Urtiaga, 6
48269 Mallabia SPAIN
Erklærer på eget ansvar, at følgende produkter som dekkes av denne erklæringen, er i overensstemmelse med bestemmelsene i Direktiv:
2006/42/EC

ÜBEREINSTIMMUNGSERKLÄRUNG

D

Wir, LARZEP, S.A.
Anschrift: Avda. Urtiaga, 6
48269 Mallabia SPAIN
Erklären aufeigene Verantwortung, , daß folgende Produkte, auf die sich diese Erklärung bezieht, mit den Bedingungen der Direktiven, 2006/42/EC
Cübereinstimmen.

DECLARATION OF CONFORMITY

GB

We, LARZEP, S.A.
Address: Avda. Urtiaga, 6
48269 Mallabia SPAIN
Declare under our sole responsibility that the following products to which this declaration relates conform with the provisions of Directives:
2006/42/EC

DICHIARAZIONE DI CONFORMITÀ

I

Noi, LARZEP, S.A.
Indirizzo: Avda. Urtiaga, 6
48269 Mallabia SPAIN
Dichiariamo sotto la nostra esclusiva responsabilità che i prodotti ai quali questa dichiarazione si riferisce sono conformi quanto previsto dalle Direttive:
2006/42/EC

VAATIMUSTEMUKAISUUSVAKUUTUS.

FIN

Me, LARZEP, S.A.
Osoite: Avda. Urtiaga, 6
48269 Mallabia SPAIN
Vakuutamme yksinomaan omalla vastuullamme, että seuraavat tuotteet, joihin tämä vakuutus liittyy, ovat seuraavien Direktiivien vaatimusten mukaisia:
2006/42/EC

VERKLARINGVAN OVEREENKOMST.

NL

Wij, LARZEP, S.A.
Adres: Avda. Urtiaga, 6
48269 Mallabia SPAIN
Verklaren geheel onder eigen verantwoordelijkheid dat de volgende produkten, waarop deze verklaring heeft in overeenstemming zijn met de bepalingen van Richtlijn:
2006/42/EC

FÖRSÄKRAN OM ÖVERESSTÄMMELSE

S

Vi, LARZEP, S.A.
Adress: Avda. Urtiaga, 6
48269 Mallabia SPAIN
Försäkrar under eget ansvar att följande produkter som omfattas av denna försäkran är i överensstämmelsemed villkoren i Direktiv:
2006/42/EC

Tipo, Type, Typ, Tyyppi.

SM / SH / SP / SMP/ SPR / SX / SMX / ST / STR / STX / SL / SAM / SAH / SAT / SATM / SSR / T / TE/ TD / D / DH / DDR / DAH / DDA / DM / DI / JM / JH / JP / Z / ZR / W / WP / X / HAM / HAE / HAZ / HAG / HAS / HFM / HFE / HAP / HAT / WI / CK / CC / CN / FU / FV / FZ / FA / CY / AA / AU / CT / C / KC / LAS / LAX

A / AB / AC / B / AF / F / HN / HL / DLG / VA / VB / VC / VZ / ECE / ECM / ECZ / EE / EM / EZ / CA / CS

AZ / AP / AR / AV / AS / AT / AX / AY / AM

Mallabia, ESPAÑA 2009 / 12 / 29

Lugar y fecha, place and date, lieu et date, plats och datum, paikka ja päivämäärä, udstedelsessted og-dato, ort und datum, plaats en datum, local e data, luogo e data.

LARZEP, S.A.

Nombre y firma, name and signature, nom et signature, namn och underskrift, nimi ja nimikirjoitus, navn og underskrift, name und unterskrift, naàm en handtekening, nome e assinatura, nome e firma.

INDEX	PAGE

WARRANTY

LARZEP, S.A. guarantees its products against all design and manufacturing defects for two years from the date of purchase. This guarantee does not include the ordinary wear of both metal and non-metal parts, abuse, using the equipment beyond its rated capacity and any wear or damage incurred as a result of using a hydraulic fluid which is not recommended by **LARZEP, S.A.**

Please note that if the equipment is disassembled or serviced by anyone other than an authorized service dealer or by **LARZEP, S.A**., this guarantee is rendered null and void.

In the event of a warranty claim, return the equipment to **LARZEP, S.A**. or the authorized dealer which sold you the hydraulic equipment. **LARZEP, S.A**. will repair or replace the faulty equipment, whichever is deemed most appropriate.

ESSENTIAL SAFETY REQUIREMENTS	
	- Read the instructions manual carefully and practise using the equipment before application. - In all cases, the operator should have received adequate training regarding the handling of the device and logical safety criteria associated with the movement of heavy loads. - This tool will function using an air or electric powered hydraulic pump. - Use socket of good performance. The quality should be according with the standard ISO-2725, ISO-1175, DIN3129, DIN3121 or ASME-B107.2/1995.
	- Choose the most suitable model for the application from the wide range available, and ensure that it will not exceed 80% of its nominal capacity during normal operation.
	- Use protective goggles for eyes protection.
	- Use protective gloves and safety helmet for hand and head protection.
	- Install the device in such a way as to ensure that the hoses are not subjected to sharp or forced bends or thrust actions that may cause them to break. Never handle or disconnect the hoses when the system is pressurized. - Include control elements (pressure gauges) in the installation in order to enable the operator to monitor the pressure in the system and ensure that the equipment's nominal capacity is never exceeded. - Before starting operation, check that the installation is correct. Clean the swivel couplings before connecting and ensure the connections are perfect. A bad connection may result in improper functioning and may even generate a safety hazard. After application, fit the dust protector to the swivel couplings. - Once you have finished using the device, check that it has not been damaged, clean it and protect it ready for storage. If there are worn or damage pieces, replace them with new ones as soon as possible.
	- Never exceed the maximum working pressure of 700 kg/cm². Ensure that all the equipment and accessories are suitable for the maximum working pressure. - Do not modify the device (do not remove the shroud of the wrench, do not remove the relief valve inside the swivel couplings,…). - Do not expose the equipment to potential hazard such as fire, sharp surfaces, intense heat or cold sources, or heavy impacts. - Do not interchange the male and female couplers on the tool or pump. It will reverse the power stroke cycle and may damage the tool. - Do not attempt to support the tool with your hands during operation. - Do not use the hoses for transporting the device. Stress can damage the hose, causing personal injury. - Do not use damaged or deteriorated hoses and fittings. - Do not use worn impact sockets or square drives.

LARZEP HYDRAULIC

RECEIPT OF GOODS

Unpack and visually check all the components, making sure that there are no oil leaks, loose or damaged couplers, damaged threads, etc. Never use components that are damaged or appear to be in poor condition.

Ensure that all the equipment and accessories are suitable for the maximum working pressure.

BOLTING TIGHTENING FORCE RECOMMENDED CHART

The belows are DIN(For you reference)

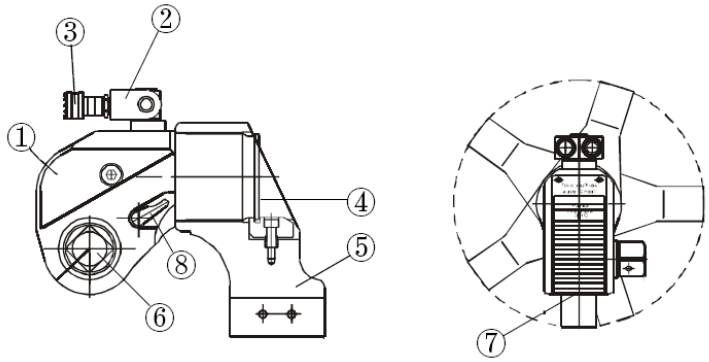
Strength Grade		4.8		6.8		8.8		10.9		12.9	
Min breaking strength		3.920 bar		5.880 bar		7.840 bar		9.410 bar		11.760 bar	
Material		Q235(SS41)		35(S35C)		35CrMo(SCM3)		42CrMo(SCM4)		40 GrNiMoA(SNCM)	
Bolting	Thread	KGM	N.m	KGM	N.m	KGM	N.m	KGM	N.m	KGM	N.m
M	mm										
14	22	7	69	10	98	14	137	17	165	23	225
16	24	10	98	14	137	21	206	25	247	36	363
18	27	14	137	21	206	29	284	35	341	49	480
20	30	18	176	28	296	41	402	58	569	69	680
22	32	23	225	34	333	55	539	78	765	93	911
24	36	32	314	48	470	70	686	100	981	120	1176
27	41	45	441	65	637	105	1029	150	1472	180	1764
30	46	60	588	90	882	125	1225	200	1962	240	2352
33	50	75	735	115	1127	150	1470	210	2060	250	2450
36	55	100	980	150	1470	180	1764	250	2453	300	2940
39	60	120	1176	180	1764	220	2156	300	2943	370	3626
42	65	155	1519	240	2352	280	2744	390	3826	470	4606
45	70	180	1764	280	2744	320	3136	450	4415	550	5390
48	75	230	2254	350	3430	400	3920	570	5592	680	6664
52	80	280	2744	420	4116	480	4704	670	6573	850	8330
56	85	360	3528	530	5149	610	5978	860	8437	1050	10290
60	90	410	4018	610	5978	790	7742	1100	10791	1350	13230
64	95	510	4998	760	7448	900	8820				
68	100	580	5684	870	8526	1100	10780				
72	105	660	6468	1000	9800	1290	12642				
76	110	750	7350	1100	10780	1500	14701				
80	115	830	8143	1250	12250	1850	18130				
85	120	900	8820	1400	13720	2250	22050				
90	130	1080	10584	1650	16170	2500	24500				
100	145	1400	13720	2050	20090						
110	155	1670	16366	2550	24990						
120	175	2030	19894	3050	29890						

NOTE:

The figure of the chart is the max. torque of the bolting. Recommended torque is 80% of chart figure.
I.e: M36, strength grade 8.8, the torque is 1764 x 80% = 1411 N·m

DESCRIPTION

The body of the hydraulic torque wrenches are made of Aluminium-Titanium. It provides high strength, tenacity, lightness and agility. Accuracy ±3%.



ITEM	NAME
①	BODY
②	360° ×180° SWIVEL JOINT
③	QUICK COUPLING
④	FIXING HOOK
⑤	360° SWIVEL REACTION ARM
⑥	SQUARE DRIVE
⑦	DRIVE RETAINER
⑧	QUICK RELEASE ARM

CONNECTING THE TOOL

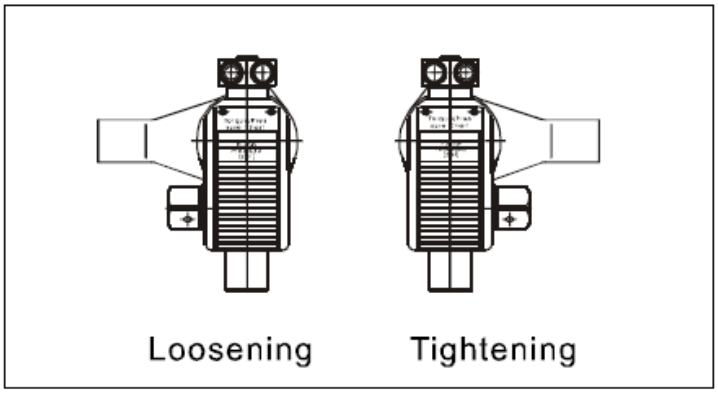
Assemble the device in accordance with the next instructions, first checking that you have all the necessary material.

- The torque wrench and the pump are connected by a twin-line hose assembly. One hose must have fitted one male coupler to each end of the hose and the other hose must have fitted one female coupler to each end to assure proper interconnection between wrench and pump.
- To fit the couplers to the hoses, apply 2 rounds of teflon around the 3/8" NPT thread of the coupler, in the thread direction, leaving the first wire of the thread without covering. Torque: 80 Nm.
- Attached the twin-line hose to the swivel inlets of the torque wrench, making sure that they are fully engaged.
- Connect the opposite ends of the hose to the pump in the same way.

SETTING THE SQUARE FOR ROTATION

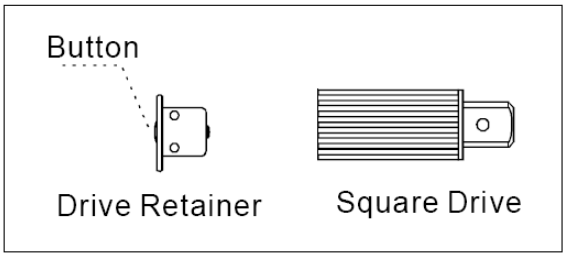
The position of the Square Drive when looking toward the Shroud determines if the tool is set to tighten or loosen the nut.

- When the Square Drive extends to the left when looking at the Shroud with the inlets away from you, the tool is set to loosen the nut.
- When the Square Drive extends to the right, the tool is set to tighten the nut.



To change the direction of rotation, remove the Square Drive and place the square drive in the desired direction.

- To remove the Square Drive, disengage the drive retainer assembly pushing the button and gently pulling on the square end of the square drive. The square drive will slide out easily.
- To insert the Square Drive, engage the drive and bushing splines, twist drive and bushing until ratchet spline be engaged. Push drive through ratchet. Push square drive retainer button, engage retainer with drive and release to lock.



SETTING THE TORQUE

After determining the desired torque, use the torque conversion chart on the Shroud or the torque conversion charts on page 10 and 11 to determine the pressure that is necessary to achieve that torque.

1. Connect the tool to the power supply and turn the pump on.

2. Depress the remote control button causing the pressure to be shown on the gauge.

3. Adjust the pressure by loosening the nut that locks the pressure adjustment handle. Rotate the handle clockwise to increase the pressure and counter clockwise to decrease the pressure. When decreasing pressure, always lower the pressure below the desired point and then bring the gauge back up to the desired pressure.

4. When the desired pressure is reached, retighten the nut and cycle the tool again to confirm that the desired pressure setting has been obtained.

The position of the Square Drive when looking toward the Shroud will determine if the tool is set to tighten or loosen the nut.

SETTING THE REACTION ARM

The torque wrenches are equipped with a universal Reaction Arm. The reaction arm should extend in the same direction of the square drive. However, slight adjustments may be made to suit to particular applications.

The function of a reaction device is to hold the tool in position against the forces generated to tighten or loosen bolts or nuts. Hydraulic wrenches generate tremendous force.

Ensure the Reaction Arm is positioned correctly.
An improperly positioned reaction arm may result in operator injury or damaged tooling.

The Reaction Arm can be positioned numerous places within a 360^{O} circle. However, for the Arm to be correctly positioned, it must be set within a 90^{O} quadrant of that circle. That quadrant is the area located between the protruding Square Drive and the bottom of the Housing away from the Swivel Inlets. It will always be toward the lower half of the Housing and on one side of the Housing when tightening and the other side when loosening.

OPERATING THE TORQUE WRENCH

The position of the Square Drive relative to the Shroud determines whether the action will tighten or loosen the nut.

The power stroke of the Piston Assembly will always turn the Square Drive toward the Shroud.

1. Place the Square Driver in the socket, insert the socket retainer ring and pin and place the socket on the nut. Make certain the Square Driver and socket are the correct size for the nut and that the Driver fully engages the nut.

2. Position the reaction arm or surface against an adjacent nut, flange or solid system component. Make certain that there is clearance for the hoses, swivel couplings. **DO NOT** allow the tool to react against the hoses, swivel couplings.

3. After having turned the Pump on and presetting the pressure for the correct torque, depress the remote control advance button to advance the Piston Assembly

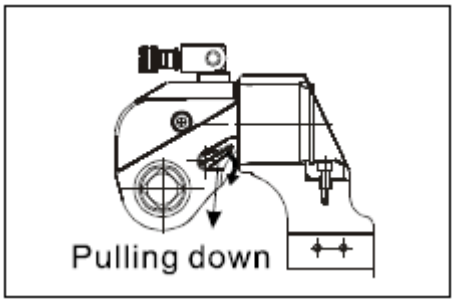
4. When the wrench is started, the reaction surface of the wrench or Reaction Arm will move against the contact point and the nut will begin to turn. Once the piston reaches the end of the stroke, depress the remote control return button to retract the piston.

5. Continue this cycling operation of advance and retract until the nut is no longer turning and the Pump Gauge reaches the preset pressure. The piston rod will retract when the retract button is depressed and under normal conditions, an audible “click” will be heard as the tool resets itself.

6. Continue to cycle the tool until it “stalls” and the preset psi/torque has been attained.

7. Once the nut stops rotating, cycle the tool one last time to achieve total torque.

During the operation, if the tool locks onto the nut, press advance button on remote and build pressure - continue to press down on remote while pulling down on the reaction pawl-release remote while continuing to pull down on reaction pawl. Then, the tool will be released from the nut.



MAINTENANCE

Lubrication frequency depends on factors known only to the user, as the amount of contaminants in the working area. Wrenches used in clean room environment will require less maintenance than wrenches used in dirty areas.

When lubrication is required, use Moly lube.

BREAKDOWNS Y REPARAIRS

The torque wrenches must always be handled and repaired by qualified personnel.

TROUBLE	POSSIBLE CAUSE	SOLUTION
Piston will not advance.	Incorrect couplers connection to the tool or pump.	Check connections.
	Faulty coupler.	Replace by a new one.
	Faulty remote control switch.	Replace the switch and/or control pendant.
	Dirt in the direction-control valve of the pump unit.	Disassemble the pump and clean the direction-control valve.
Piston will not retract.	Incorrect couplers connection to the tool or pump.	Check connections.
	Faulty coupler.	Replace by a new one.
	Faulty remote control switch.	Replace the switch and/or control pendant.
	Dirt in the direction-control valve of the pump unit.	Disassemble the pump and clean the direction-control valve.
	Hose connections reversed.	Check that the advance on the pump is connected to the advance on the tool and retract on the pump is connected to the retract on the tool.
	Retract hose not connected.	Connect the retract hose securely.
	Retract pin broken.	Replace the broken pin and/or spring.
Cylinder will not build up pressure.	Piston seal and/or end plug seal leaking	Replace any defective O-rings.
	Leaking connection.	Check connections.
	Faulty coupler.	Replace by a new one.
Square Drive will not turn.	Grease or dirt build up in the teeth of the ratchet and segment pawl.	Disassemble the ratchet and clean the grease or dirt out of the teeth.
	Worn or broken teeth on ratchet and/or segment pawl.	Replace any worn or damaged parts.
Tool tightens immediately when turned on.	Hose connections are reversed.	Depress the advance button to release the tool; shut the pump off in the advance position and reverse the hose connection.
Pump will not build up pressure.	Faulty relief valve.	Inspect, adjust or replace the relief valve.
	Air supply too low or air hose too small.	Make certain the air supply and hose size comply with the pump manual recommendation.
	Electric power source is too lo w.	Make certain the amperage, voltage and any extension cord size comply with the pump manual requirements.
	Faulty gauge.	Replace by a new one.
	Low oil level.	Check and fill the pump reservoir.
	Clogged filter.	Inspect, clean and/or replace the pump filter.
Pressure reading erratic.	Faulty gauge.	Replace by a new one.
Nut Returns with retract stroke.	Ball plungers are not engaging the drive sleeves.	Thread the ball plungers to the correct depth in the housing.

LARZEP HYDRAULIC

LAS HYDRAULIC TORQUE WRENCH PRESSURE - TORQUE CHART

Bar / N·m										
Pressure	**LAS01**	**LAS02**	**LAS04**	**LAS07**	**LAS10**	**LAS15**	**LAS26**	**LAS34**	**LAS48**	**LAS72**
bar	N·m	N·m	N·m	N·m	N·m	N·m	N·m	N·m	N·m	N·m
70	112	183	451	752	1.078	1.551	2.666	3.472	4.866	7.200
80	128	209	515	860	1.232	1.773	3.047	3.968	5.561	8.229
90	144	236	580	967	1.386	1.994	3.428	4.464	6.256	9.257
100	160	262	644	1.075	1.540	2.216	3.809	4.960	6.951	10.286
110	176	288	709	1.182	1.694	2.437	4.189	5.456	7.647	11.314
120	192	314	773	1.290	1.848	2.659	4.570	5.952	8.342	12.343
130	208	341	838	1.397	2.002	2.880	4.951	6.448	9.037	13.371
140	224	367	902	1.505	2.156	3.102	5.332	6.944	9.732	14.400
150	240	393	967	1.612	2.310	3.324	5.713	7.440	10.427	15.429
160	256	419	1.031	1.720	2.464	3.545	6.094	7.936	11.122	16.457
170	272	446	1.096	1.828	2.618	3.767	6.475	8.432	11.817	17.486
180	288	472	1.160	1.935	2.772	3.988	6.855	8.928	12.513	18.514
190	304	498	1.225	2.043	2.926	4.210	7.236	9.424	13.208	19.543
200	320	524	1.289	2.150	3.080	4.431	7.617	9.920	13.903	20.571
210	336	551	1.353	2.258	3.234	4.653	7.998	10.416	14.598	21.600
220	352	577	1.418	2.365	3.388	4.875	8.379	10.912	15.293	22.629
230	368	603	1.482	2.473	3.542	5.096	8.760	11.408	15.988	23.657
240	384	629	1.547	2.580	3.696	5.318	9.141	11.904	16.683	24.686
250	400	656	1.611	2.688	3.850	5.539	9.521	12.400	17.379	25.714
260	416	682	1.676	2.796	4.004	5.761	9.902	12.896	18.074	26.743
270	432	708	1.740	2.903	4.158	5.982	10.283	13.392	18.769	27.771
280	448	734	1.805	3.011	4.312	6.204	10.664	13.888	19.464	28.800
290	464	761	1.869	3.118	4.466	6.426	11.045	14.384	20.159	29.829
300	480	787	1.934	3.226	4.620	6.647	11.426	14.880	20.854	30.857
310	496	813	1.998	3.333	4.774	6.869	11.807	15.376	21.549	31.886
320	512	839	2.063	3.441	4.928	7.090	12.187	15.872	22.245	32.914
330	528	866	2.127	3.548	5.082	7.312	12.568	16.368	22.940	33.943
340	544	892	2.191	3.656	5.236	7.533	12.949	16.864	23.635	34.971
350	560	918	2.256	3.764	5.390	7.755	13.330	17.360	24.330	36.000
360	576	944	2.320	3.871	5.544	7.977	13.711	17.856	25.025	37.029
370	592	971	2.385	3.979	5.698	8.198	14.092	18.352	25.720	38.057
380	608	997	2.449	4.086	5.852	8.420	14.473	18.848	26.415	39.086
390	624	1.023	2.514	4.194	6.006	8.641	14.853	19.344	27.111	40.114
400	640	1.049	2.578	4.297	6.160	8.863	15.234	19.840	27.806	41.143
410	656	1.076	2.643	4.405	6.314	9.084	15.615	20.336	28.501	42.171
420	672	1.102	2.707	4.512	6.468	9.306	15.996	20.832	29.196	43.200
430	688	1.128	2.772	4.619	6.622	9.528	16.377	21.328	29.891	44.229
440	704	1.154	2.836	4.727	6.776	9.749	16.758	21.824	30.586	45.257
450	720	1.181	2.900	4.834	6.930	9.971	17.139	22.320	31.281	46.286
460	736	1.207	2.965	4.942	7.084	10.192	17.519	22.816	31.977	47.314
470	752	1.233	3.029	5.049	7.238	10.414	17.900	23.312	32.672	48.343
480	768	1.259	3.094	5.157	7.392	10.635	18.281	23.808	33.367	49.371
490	784	1.286	3.158	5.264	7.546	10.857	18.662	24.304	34.062	50.400
500	800	1.312	3.223	5.371	7.700	11.079	19.043	24.800	34.757	51.429
510	816	1.338	3.287	5.479	7.854	11.300	19.424	25.296	35.452	52.457
520	832	1.364	3.352	5.586	8.008	11.522	19.805	25.792	36.147	53.486
530	848	1.391	3.416	5.694	8.162	11.743	20.185	26.288	36.843	54.514
540	864	1.417	3.481	5.801	8.316	11.965	20.566	26.784	37.538	55.543
550	880	1.443	3.546	5.909	8.470	12.186	20.947	27.280	38.233	56.571
560	896	1.469	3.610	6.016	8.624	12.408	21.328	27.776	38.928	57.600
570	912	1.696	3.674	6.123	8.778	12.630	21.709	28.272	39.623	58.629
580	928	1.522	3.738	6.231	8.932	12.851	22.090	28.768	40.318	59.657
590	944	1.548	3.803	6.338	9.086	13.073	22.471	29.264	41.013	60.686
600	960	1.574	3.867	6.446	9.240	13.294	22.851	29.760	41.709	61.714
610	976	1.601	3.932	6.553	9.394	13.516	23.232	30.256	42.404	62.743
620	992	1.627	3.996	6.661	9.548	13.737	23.613	30.752	43.099	63.771
630	1.008	1.653	4.061	6.768	9.702	13.959	23.994	31.248	43.794	64.800
640	1.024	1.679	4.125	6.875	9.856	14.181	24.375	31.744	44.489	65.829
650	1.040	1.706	4.190	6.983	10.010	14.402	24.756	32.240	45.184	66.857
660	1.056	1.732	4.254	7.090	10.164	14.624	25.137	32.736	45.879	67.886
670	1.072	1.758	4.319	7.198	10.318	14.845	25.517	33.232	46.575	68.914
680	1.088	1.784	4.383	7.313	10.472	15.067	25.898	33.728	47.270	69.943
690	1.104	1.811	4.448	7.420	10.626	15.288	26.279	34.224	47.965	70.971
700	1.120	1.837	4.512	7.528	10.780	15.516	16.664	24.725	48.666	72.000

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psi / ft.lbs										
Pressure	**LAS01**	**LAS02**	**LAS04**	**LAS07**	**LAS10**	**LAS15**	**LAS26**	**LAS34**	**LAS48**	**LAS72**
psi	ft.lbs	ft.lbs	ft.lbs	ft.lbs	ft.lbs	ft.lbs	ft.lbs	ft.lbs	ft.lbs	ft.lbs
1.000	81	134	328	547	783	1.127	1.937	2.523	3.535	5.230
1.200	97	160	393	655	938	1.350	2.320	3.021	4.233	6.263
1.400	114	189	462	770	1.102	1.586	2.726	3.551	4.975	7.361
1.600	130	215	526	878	1.257	1.809	3.109	4.049	5.673	8.394
1.800	146	242	591	986	1.411	2.031	3.491	4.548	6.372	9.427
2.000	162	268	656	1.094	1.566	2.254	3.874	5.046	7.070	10.460
2.200	179	296	725	1.209	1.730	2.491	4.281	5.576	7.812	11.558
2.400	195	323	790	1.317	1.885	2.713	4.663	6.074	8.510	12.591
2.600	211	349	854	1.425	2.040	2.936	5.046	6.572	9.208	13.624
2.800	228	377	923	1.540	2.204	3.172	5.452	7.102	9.950	14.721
3.000	244	404	988	1.648	2.359	3.395	5.835	7.600	10.649	15.755
3.200	260	430	1.053	1.756	2.513	3.618	6.218	8.099	11.347	16.788
3.400	276	457	1.118	1.864	2.668	3.840	6.600	8.597	12.045	17.821
3.600	293	485	1.186	1.979	2.832	4.077	7.007	9.126	12.787	18.918
3.800	309	511	1.251	2.087	2.987	4.299	7.389	9.625	13.485	19.951
4.000	325	538	1.316	2.195	3.142	4.522	7.772	10.123	14.184	20.985
4.200	341	564	1.381	2.303	3.296	4.745	8.155	10.622	14.882	22.018
4.400	358	592	1.450	2.418	3.461	4.981	8.561	11.151	15.624	23.115
4.600	374	619	1.514	2.526	3.615	5.204	8.944	11.649	16.322	24.148
4.800	390	645	1.579	2.634	3.770	5.426	9.326	12.148	17.020	25.181
5.000	407	673	1.648	2.749	3.934	5.663	9.733	12.677	17.762	26.279
5.200	423	700	1.713	2.857	4.089	5.885	10.115	13.176	18.461	27.312
5.400	439	726	1.778	2.965	4.244	6.108	10.498	13.674	19.159	28.345
5.600	455	753	1.842	3.073	4.398	6.331	10.881	14.172	19.857	29.378
5.800	472	781	1.911	3.187	4.563	6.567	11.287	14.702	20.599	30.476
6.000	488	807	1.976	3.296	4.717	6.790	11.670	15.200	21.297	31.509
6.200	504	834	2.041	3.404	4.872	7.012	12.052	15.699	21.996	32.542
6.400	521	862	2.110	3.518	5.036	7.249	12.459	16.228	22.737	33.640
6.600	537	888	2.175	3.626	5.191	7.472	12.842	16.727	23.436	34.673
6.800	553	915	2.239	3.734	5.346	7.694	13.224	17.225	24.134	35.706
7.000	569	941	2.304	3.843	5.500	7.917	13.607	17.723	24.832	36.739
7.200	586	969	2.373	3.957	5.665	8.153	14.013	18.253	25.574	37.837
7.400	602	996	2.438	4.065	5.819	8.376	14.396	18.751	26.272	38.870
7.600	618	1.022	2.503	4.173	5.974	8.599	14.779	19.250	26.971	39.903
7.800	635	1.050	2.571	4.288	6.138	8.835	15.185	19.779	27.713	41.001
8.000	651	1.077	2.636	4.396	6.293	9.058	15.568	20.277	28.411	42.034
8.200	667	1.103	2.701	4.504	6.448	9.280	15.950	20.776	29.109	43.067
8.400	683	1.130	2.766	4.612	6.602	9.503	16.333	21.274	29.807	44.100
8.600	700	1.158	2.835	4.727	6.767	9.740	16.740	21.804	30.549	45.198
8.800	716	1.184	2.899	4.835	6.921	9.962	17.122	22.302	31.248	46.231
9.000	732	1.211	2.964	4.943	7.076	10.185	17.505	22.800	31.946	47.264
9.200	748	1.237	3.029	5.051	7.231	10.407	17.887	23.299	32.644	48.297
9.400	765	1.266	3.098	5.166	7.395	10.644	18.294	23.828	33.386	49.394
9.600	781	1.292	3.163	5.274	7.550	10.867	18.677	24.327	34.084	50.428
9.800	797	1.318	3.227	5.382	7.704	11.089	19.059	24.825	34.783	51.461
10.000	814	1.344	3.278	5.470	7.831	11.272	19.370	25.226	35.354	52.300

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