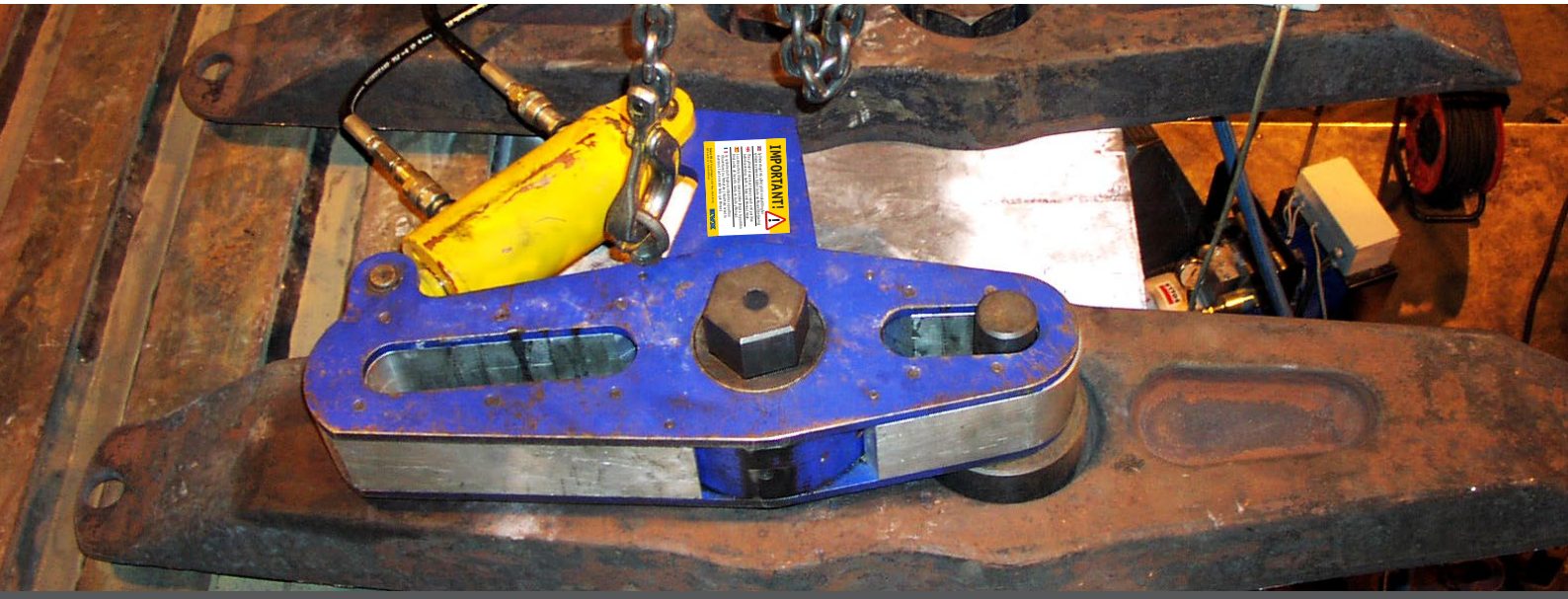
MORE BITE FOR YOUR MONEY

Installation of teeth and wearplates –

HYDRAULIC TORQUE TOOL PROCEDURES



2015 edition

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OPERATING INSTRUCTIONS

Description of tool

The KVX hydraulic tools each consist of a housing, a one-way ratchet with socket drive, hydraulic cylinder, drive socket, reaction force socket and a reaction force pin.

Technical Spesifications

Torque Wrench Model	179050		179032		179080	
Bolt Size	M48~M68		M48~M90		M48~M100	
Max. Operating torque (normal use)	@525 bar	35 700Nm	@525 bar	58 800Nm	@525 bar	89 775Nm
Extreme intermittent torque *	@575 bar	39 100Nm	@575 bar	64 400Nm	@575 bar	98 325Nm
Socket Drive	60 mm hex		74 mm hex		74 mm hex	
Centre distance between drive/ reaction socket variable	125 - 200 mm		125 - 300 mm		125 - 300 mm	
Available standard socket sets:	All from M48 to M68		All from M48 to M80		All from M60 to M100	

Moment at endstroke of cylinder (friction included).
**To avoid damaging the tool set max powerpack relief pressure no greater than 575 bar.*

Expected Torque Time per bolt at different Torque tools

(based on largest rated bolt size- worst case)

	PowerPack	Output	TORQUE TOOL 179050	179032	179080
Single Phase unit	**Example 1:** Typical 2 stage 1 phase pump peformance (eg Enerpac ZU4T or Lösomat)	*Lösomat:* Output @ 3,7 l/min at low pressure and 0,9 l/m at high pressure, switchover point at 300 bar	3 min 33 sec (M68 Bolt)	5 min 54 sec (M80 Bolt)	11 min 54 sec (M100 Bolt)
Single Phase unit	**Example 2:** Typical 3 stage 1-phase pump (e.g. Jetpro12.3)	Output @12-3,1- 1,4 l/min (three stage) at pressures of 70-210-700 bar	2 min 26 sec (M68 Bolt)	4 min 37 sec (M80 Bolt)	8 min 05 sec (M100 Bolt)

For flow rates higher than shown, one must use larger power packs i.e threephase units, or otherwise driven.
For a constant flow unit of 10 l/min and a max pressure of 700 bars (10 000 psi) the power demand will be about 15 kW.
A power pack unit of 7,5 kW will approximately double the times given below.

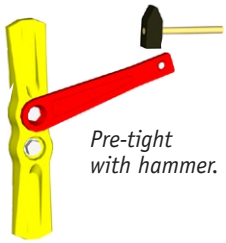
	PowerPack	Output	179050	179032	179080
3-phase unit	**Example 3:** Hypothetical 15kW high powered pump	15 kW Motor @ constant flow 10 l/min, max pressure of 700 bars	50 sec (M68 Bolt)	1 min 24 sec (M80 Bolt)	2 min 49 sec (M100 Bolt)

However, there is a limit to the oil flow the tool can absorb due to high pressure hose dimensions and various couplings.
An oil flow up to 12 l/min should be acceptable.

Tightening/loosening bolts for 2-bolt teeth and 2-bolt wear plates

KVX Hydraulic tool with socket and reaction socket.

Before the hydraulic tool is applied, the bolts should be pre-torqued to 5% of final nominated torque using a torque wrench. On smaller systems (<M68) an alternative pre-torque method is to simply hit the standard KVX red (flogging) spanner with a 1.5kg sledge hammer until it stops. Pre-torquing the bolts correctly will assist in correctly aligning the tooth/wearplate, otherwise threads and bolts may be damaged, and will also provide a more accurate correlation between torque turn and hydraulic pressure. Power Pack instructions following assume use of Enerpac ZU4T.



Pre-tight with hammer.

1. Place drive socket and reaction socket on the bolt pair. If the hex. heads are worn the sockets should be bolted on to the bolt heads if possible. (Bolts M36 and larger now come with holes through the middle of the bolt.)
2. Lower the tool onto the socket shafts mating the drive socket first, then twist the tool in the ratchetable direction to mate the reaction socket. Slide the tool all the way down on the sockets. (*see Special Notes on page 4).

3. Start torquing operation by using the hydraulic power pack. The power pack may be run in automatic or in manual mode, but it is easiest and fastest to run in automatic mode if available on chosen powerpack.
4. Observe the powerpack pressure gauge for correct pressure reading, and stop the power pack when the cylinder is fully retracted.
5. When tightening it is advisable to run in automatic mode, and reference pressures just prior to the end of the drive stroke (see note 8. below).
6. When loosening, one can start in manual mode for a couple of strokes if desired, (to check loosening torque) and then turn to automatic mode.
7. It is of key importance that the ratchet mechanism must always do full cylinder strokes. This is best obtained in automatic mode, as the power pack function reverses cylinder function at high oil pressure rise or oil flow stoppage (cylinder at end position).
8. The best way to read the pressure is to observe the indicated pressure on the powerpack's pressure gauge just prior to end stroke of cylinder, when there is still motion. At end position the pressure will rise sharply.

Powerpack pressure gauge.

Tightening/loosening of a single bolt

Follow the 2-bolt instructions above but note the following suggestions concerning reaction options due to the absence of a second bolt.

Most new systems have a "reaction hole" on lip or on tooth. Pin 160093 should be inserted through tool slot and into this hole. When a single bolt is to be torqued, and no "reaction hole" is available, one should try to reach some other bolt for the reaction socket. This bolt does not have to be of equal size as the one being torqued.

The maximum distance for "normal" reaction force take-up is 300 mm for the 179080 tool and 200 mm for both the 179050 and 179032 tools. When the distance exceeds this, one must arrange a fixed or solid reaction-force take-up, contacting the tool as low as possible (bottom plate of tool).

Control panel – Power Pack Dependant

Reference the Operating Instructions for your chosen powerpack.

Maintenance

If it is apparent that much grit or sand has entered into (contaminated) the ratchet mechanism, the tool should be disassembled, cleaned and regreased. Make sure that the pawl springs seat properly in the pawl spring seats.

If replacement parts are needed, KVX has all in stock, and can also supply a Repair-Kit containing likely required smaller parts.

It is important that the pawls move freely, so regular cleaning and maintenance is required; this is the best way to ensure proper operation at all times.

IMPORTANT!

Sylinderstaget må alltid gå til endestilling før sylinder reverseres, både i Auto og Manuell betjening!

The cylinder stroke must always reach end position before reversing, both in Auto and Manual mode.

La carrera del cilindro siempre debe llegar a la posición final antes de invertir, tanto en Auto y Manual.

Le cylindre doit toujours atteindre sa position d'ouverture (ou fermeture) maximale avant la réversion, tant en mode Auto que Manuel.

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KVX

Torque Table for 179050 tool

Weight: 35 kg

Bolt size	Dowelled components			Non-dowelled components		
	Angle	*Torque*	*Cyl.stroke appr. end Position*	*Angle*	*Torque*	*Cyl.stroke appr. end Position*
M36	-	-	-	60º	3000 Nm	44 bar
M48	-	-	-	90º	7500 Nm	110 bar
M52	150º	12000 Nm	176 bar	105º	10500 Nm	147 bar
M60	180º	18000 Nm	263 bar	120º	15000 Nm	220 bar
M68	180º	26500 Nm	388 bar	120º	22500 Nm	329 bar

Torque Table for 179032 tool

Weight: 58 kg

Bolt size	Dowelled components			Non-dowelled components		
	Angle	*Torque*	*Cyl.stroke appr. end Position*	*Angle*	*Torque*	*Cyl.stroke appr. end Position*
M48	-	-	-	90º	7500 Nm	67 bar
M52	150º	12000 Nm	107 bar	105º	10500 Nm	-
M60	180º	18000 Nm	161 bar	120º	15000 Nm	134 bar
M68	180º	26500 Nm	237 bar	120º	22500 Nm	202 bar
M80	180º	44000 Nm	366 bar	150º	37000 Nm	330 bar
*M90	180º	65000 Nm	518 bar	150º	52000 Nm	465 bar

** For M90 2-bolt system, tool 179080 may be selected due to increased loosening torque (due to rust floss of lubricant).*

Torque Table for 179080 tool

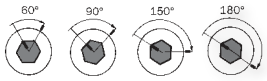
Weight: 75 kg

Bolt size	Dowelled components			Non-dowelled components		
	Angle	*Torque*	*Cyl.stroke appr. end Position*	*Angle*	*Torque*	*Cyl.stroke appr. end Position*
M52	150º	12000 Nm	70 bar	105º	10500 Nm	-
M60	180º	18000 Nm	105 bar	120º	15000 Nm	88 bar
M68	180º	26500 Nm	155 bar	120º	22500 Nm	132 bar
M80	180º	44000 Nm	240 bar	150º	37000 Nm	217 bar
M90	180º	65000 Nm	339 bar	150º	52000 Nm	305 bar
M100	180º	89000 Nm	410 bar	150º	73000 Nm	381 bar

LIFETIME OF BOLTS

For safety reasons KVX recommend that bolts be replaced at least every 4 sets of non-reversible teeth/wear plates or every 2 sets of reversible teeth/ wear plates (ie. after 4 x torque-ups/ tensionings).

If bolts are damaged or worn to less than the minimum number of threads (see page 6), replace bolts.



*)SPECIAL NOTES

"Best Practice" for Bolt Tensioning

For the 2-bolt system: There are two ways of ensuring proper end torque - twist angle of bolt from a pre-torqued position and by using a suitable torque indicating tool. There exist a fairly good proportionality between torque and angle of twist of bolt for the 2-bolt system. In case of uneven mating surfaces, there may be little discrepancy, but this is compensated by increasing angle of bolt twist. Laboratory tests have shown that the KVX bolts can be twisted a large amount beyond recommended angle without failure. The pre-torque mentioned above, is accomplished by sledging on the KVX spanner until bolt is well seated. The tabular angles and torques can be trusted and used, but the angle of twist will normally be less than tabled (approx 15-30 degrees).

For the 1-bolt system: There are some different factors influencing the torque achieved by angular twist of bolt. This has to do with tolerance variations between bolt seats, causing tooth to be off the final clamped position - as it is not properly seated. Also the tooth and the lip flex a little when torquing the bolt because the gap between the tooth and the lip. These factors contribute to a larger angle of twist of bolt than for the 2-bolt system. Experience has also shown that the 1-bolt system need a higher bolt tensioning, probably caused by "seating" of the ball dowels. This is also increasing the angle of twist. When using a torque indicating tool, it is straight forward - stop torquing at prescribed torque! The tables given are OK, but a fairly accurate proportion between torque angle cannot be expected.

The safest and most reliable tensioning option, however, is to use BOTH the Hydraulic Tool Instructions' hydraulic "Pressure Setting" values AND the "Torque Turn" method simultaneously. This way, one method provides a safety check for the other method. Effective Troubleshooting is made easier in the event of a tensioning problem, and safety is also enhanced.

When using both methodologies simultaneously (non-dowelled teeth and wearplates):

- Torque the bolts to the lower of the two prescribed parameters- for instance, if the prescribed Torque Turn is reached before the prescribed Pressure Setting, stop at this point (or vica versa).
- Note Torque Turn and Hydraulic Pressure at this point.
- If both parameters are within 20% of the KVX specifications provided, continue torquing in "manual" mode, until actual prescribed Hydraulic Pressure is reached.
- If either of the two parameters (Torque Turn or Hydraulic Pressure Setting) is less than 80% of the prescribed specification at this point (when the other parameter has been reached), refer to the Troubleshooting Guide below. Follow the Troubleshooting checks and, if the two methodologies (Torque Turn and hydraulic Pressure Setting) still differ by more than 20%, tension to the lower of the two specified parameters (as instructed above), record all information and contact KVX for further advice.

TROUBLESHOOTING GUIDE

Reference to pressure % settings and % torque angle are applicable to 2-bolt (non-dowelled) systems only.

Event	Possible Causes (check)	Remedy
1. General Checks if Torque Turn and hydraulic Pressure Setting values differ by more than 20% once the first specified parameter is reached.	1. Are the correct Tool Instructions, Pressure Setting and Torque Turn values being used? (it is vitally important that the Tool Instructions, Pressure Setting Table and Torque Turn being used correspond to the actual Tool and Bolt size you are using. Errors can be very dangerous)	a. Check Tool Part number and Bolt size b. Check that correct tool size, pressure setting and bolt dimension information in Table on page 4 are being used. c. Re-check Torque Turn value for bolt d. If they don't correspond, locate correct Instructions, Pressure Setting and Torque Turn for Tool and Bolt being used. e. If Tool Part number can't be identified or verified, seek assistance from KVX. (Note tool masses on page 4) f. If all Instructions are correct for the Tool and Bolt being used proceed to "2."
	2. Are the high pressure couplings tightened?	Loose high pressure couplings will block or restrict oil flow.
	3. Are you using the correct lubricant?	We always recommend the graphite free KVX recommended grease. When using other lubricants, such as copper lubricant, it affects the friction co-effi cient, and the correct torque will not be reached. This will most likely cause a system failure for which KVX can not be held responsible.
	4. Faulty Pressure Gauge on Powerpack?	Pressure Gauges can read inaccurately (travel damage, etc,) or can even provide erroneous values when connected with long hoses and high oil flow. a. Has the Gauge been calibrated/checked recently? (Check) b. If not, have the gauge checked, or utilise an alternative calibrated gauge.
	5. Is Tool or Powerpack damaged or worn	These Instructions assume that Tool and Powerpack are both in good condition, calibrated and clean (see "Maintenance" above for Tool). The Tool is quite simple in construction and any problems should be easily identifiable-seek guidance if unsure. The Powerpack is more complicated. If pressure gauge has been checked for accuracy and all functions are working as per instructions, it is unlikely that the Powerpack would be responsible for tensioning errors. If, however, you suspect technical problems with the Powerpack, have it inspected by a qualified maintenance provider or contact KVX for further instructions.
	6. Are teeth or Lip bent/ warped?	Under very heavy loads it is possible that KVX teeth may be bent during service. When re-installing a used tooth check that the primary mating area is flat. It is also possible, though very rarely, that a KVX tooth or lip has been warped during manufacture. Check that the tooth + lip mating surfaces are longitudi-nally flat. A "straight edge" can be used for these checks. Contact KVX for acceptable convex and concave tolerances.
2. Prescribed hydraulic Pressure value is reached when cor-responding Torque Turn is less than 80% of prescribed value	*Follow General Checks 1 to 4. above, then proceed with further checks as follows:*	
	1. Have you correctly lubri-cated the Bolts, Cones and threads	The most common reason for not achieving Torque Turn when Pressure Setting has already been achieved is "inappropriate lubrication". a. Ensure that you are using one of the two x authorised lubricants above. b. Ensure that grease is thoroughly mixed (especially if Molypan N grease is being used) c. Ensure that all bolting surfaces are covered- threads in bolt and Lip/tooth, cones on bolt and Lip/tooth. (while bolting surfaces must be thoroughly lubricated, ensure that lubricant does not get trapped between Lip and Tooth frictional contact surfaces, as this could lead to tooth loosening)
	2. Are cones, threads or Lip-to-tooth contact surfaces damaged or contaminated?	Visible damage to cones, threads and contact surfaces can lead to tensioning and tooth loosening problems. Contamination (grit, dirt, metal shavings, etc.) can also cause similar problems. Ensure all threads, cones and Lip-to-tooth contact surfaces are clean and undamaged (burrs removed, etc.) before re-tensioning.

Event	Possible Causes (check)	Remedy
3. Prescribed Torque Turn value is reached when corresponding Tool hydraulic Pressure is less than 80% of prescribed value	*Follow General Checks 1. to 4. at top of table, then proceed with further checks as follows:*	
	1. Check for damaged or fatigued Bolt	If bolt has been re-used a number of times, has too few threads remaining, or has been over-torqued previously it must be replaced. a. Check for cracks or unusual twists, stretching, thinning, etc. in actual bolt vs a new bolt. b. Check bolt HEX head for burring or rounding, etc. c. Check the number of remaining threads in the bolt against charted values in the Table below. (on wheel loader systems particularly, bolt threads can be worn right away, making re-tensioning difficult or impossible. The table below is particularly for Tooth bolts. Cutting edge bolts may not require full torque/ tension). If parameters in a., b. or c. above are not correct, replace the bolt. Minimum Number of Threads for Re-use of Bolt on Teeth M80 –> 7 M68 –> 6 M60 –> 5.5 M48 –> 5 M36 –> 4.5 M27 –> 5.5 M20 –> 4
	2. Check Sockets and Reaction points **DANGER!!**	a. Ensure that sockets being used are NOT DAMAGED OR CRACKED, and that they are correct for the Tool and bolts being torqued. b. Check that the Reaction points (bolt head, bucket sidewall or other suitable reaction surface) are secure, undamaged and suitable for the torquing operation (check reaction sockets as in a above).

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SAFETY!

Extreme caution should be exercised whenever the tool is used. Although the tool is designed to be very safe it is still possible that materials can fail or the "grip" may be lost under very heavy operating conditions. This may cause parts to break or dislocate with considerable force. Hard helmet, safety goggles, hand gloves and safety shoes should be used. Whenever torque is building up, the personnel should move away from the tool location a minimum of 2 metres, and operate it remotely with the powerpack's control panel.

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