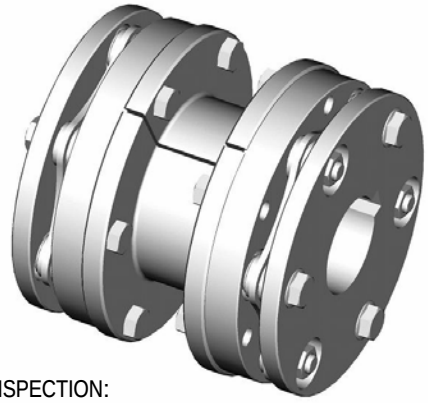
SXCST Disc Coupling Installation Guide



INTRODUCTION:

The following document is intended for the explicit use of Lovejoy customers to aid in the installation of Lovejoy power transmission products. The information may be considered privileged and should only be disseminated as an active part of conducting business with Lovejoy, Inc.

Although the coupling may have been properly specified during the design and selection process before the coupling was ordered, operational conditions could possibly have changed prior to installation. Lovejoy, Inc. provides the information and technical support necessary to ensure the appropriate disc coupling selection was made relative to the product specifications and limitations of Lovejoy's power transmission products. The end user is ultimately responsible for verifying the suitability of the final coupling selection based on the actual service conditions at the time of the coupling installation.

Correct installation and alignment practices will ensure longer coupling life, trouble free operation, and a safer operating environment for the coupling. Please thoroughly review all of the following instructions prior to installing this coupling and placing it in operation. Proper safety guidelines and practices should always be followed during every phase of the installation.

This installation document is considered part of the purchased product and should be retained for future reference.

SAFETY:

Accidents involving rotating equipment may result in loss of life, serious bodily harm, or property damage. The purchaser of this equipment must assure that the equipment is properly assembled, installed, safeguarded, operated, and maintained. This equipment should never be operated at or subjected to conditions that exceed manufacturer's specifications.

Consult all applicable Federal, State and local laws and regulations covering the safe operation and maintenance of equipment, including, without limitation, the USDOL-OSHA "Lockout / Tag-out" procedure set forth in 29 CFR 1910.147.

Because of the possible danger to persons or property from accidents which may result from the improper use or unapproved modifications of the product, this product must be installed, maintained and operated in accordance with the procedures, standards, and engineering specifications specified in the product literature. To assure safe operation, this product should be inspected in accordance with the instructions described in this document. Proper guards and any suitable safety equipment or procedures as may be necessary, or as may be specified in safety codes, should be installed by the user. Safety equipment, coupling guards, and shields are not provided by, nor are they the responsibility of Lovejoy, Inc.

Symbols and text format used in this document may contain safety information and will appear similar to the following:

Warning! *This symbol indicates safety measures which must be observed to avoid personal injury.*

Caution! This symbol indicates safety measures which must be observed to avoid damage to coupling.

PRODUCT INSPECTION:

Prior to installation, the coupling should be examined for signs of damage that may have occurred as a result of shipping or handling. Refer to the following chart (Table 1) to ensure all the ordered parts are present.

Note: SXCST Series Disc Couplings are shipped unassembled.

Table 1 - Components

Size	Hubs	Mounting (Guard) Ring	Two Piece Split Spacer	Disc Pack	Disc Pack Bolts & Nuts	Hub Bolts
090-6	2	2	1	2	12	12
110-6	2	2	1	2	12	12
132-6	2	2	1	2	12	12
158-6	2	2	1	2	12	12
185-6	2	2	1	2	12	12
202-6	2	2	1	2	12	12
228-6	2	2	1	2	12	12
255-6	2	2	1	2	12	12
278-6	2	2	1	2	12	12
302-6	2	2	1	2	12	12
325-6	2	2	1	2	12	12
345-6	2	2	1	2	12	24
380-6	2	2	1	2	12	24
410-6	2	2	1	2	12	24
440-6	2	2	1	2	12	24

For maximum protection, the coupling and all components should be stored in the original packaging. All parts should be measured prior to installation to ensure correctness of parts to meet the application requirements; such as the hub bore diameter, shaft diameter, shaft separation, bolt lengths, key sizes, etc.

Warning! *Before beginning the coupling installation, make sure the machinery is made safe. Disconnect and lock out all power to the equipment. No part of the installation should be performed on moving or unstable equipment.*

Caution**!**

Lovejoy manufactured the coupling interface based on the equipment and shaft data supplied by the purchaser. Lovejoy is not responsible for inaccurate or incomplete information supplied by the purchaser.

It is the purchasers' responsibility to assure that the interface connections (Flanges, Bolts, Keys, Hydraulic Fits, Etc.) between the coupling and the connected equipment are capable of handling the anticipated loads.

REQUIRED TOOLS:

- Calipers
- Calibrated Torque Wrench
- Sockets and appropriate open end wrenches
- Alignment Equipment
- Appropriate hoist or lifting equipment

COUPLING AND COMPONENT PREPARATION:

All exposed surfaces of the coupling and components, including hubs, sleeves, spacers, and any subassemblies should be thoroughly cleaned prior to installation to remove any protective coatings normally applied by Lovejoy at the factory intended to protect the coupling surfaces during shipping. All coupling parts, equipment components, shafts, and keyways must be clean and free of any foreign materials prior to attempting assembly or installation. A clean cloth dampened with a nonflammable solvent should be sufficient for this cleaning.

All sleeves, seals, hub bores, shafts, keys, and keyways must be checked for raised metal, nicks, burrs, dents, gouges, etc., and should be dressed or repaired accordingly prior to installation.

a. Prior to removing any existing disc coupling, record the Distance Between Shaft Ends (BSE) between the driver and driven equipment and compare this value with the BSE of the Lovejoy SXCST disc coupling in Table 4 to verify the fit of the coupling.

b. Once all necessary measurements have been taken and all components are verified as correct, remove the existing coupling and dress the shafts of the driver and driven equipment.

c. If the final BSE is the same as the specified BSE of the Lovejoy SXCST disc coupling, then the hubs can be mounted flush with the ends of the driver and driven equipment shafts.

d. If the final BSE is different than the specified BSE of the Lovejoy SXCST disc coupling, then the hubs must be mounted on the driver and driven equipment shafts with the correct distance from the ends of the shafts.

Note: Hubs will be mounted on the driver and driven shafts with the hub flanges facing toward the equipment.

1. **For all Lovejoy Disc Style Couplings**, Lovejoy supplies '**inch**' dimensioned straight hub bores with a keyway machined to the industry accepted ANSI/AGMA 9002-B04 Standards' tolerance for interference fit unless otherwise specified. Tapered and spline bores may require special manufacturing and installation consideration.

2. **For all Lovejoy Disc Style Couplings**, Lovejoy supplies '**metric**' dimensioned straight hub bores with a keyway machined to the industry accepted ISO 286-2 Standards' tolerance for interference fit unless otherwise specified. Tapered and spline bores may require special manufacturing and installation consideration.

CAUTION! Hubs, disc packs, spacers, and mounting rings must be supported during installation to avoid accidental damage should they slip.

3. **Straight Bore (Clearance Fit)**: Install the keys in the shaft. The key(s) should have a snug side-to-side fit with a small clearance over the top of the key. To maintain dynamic balance, the key(s) should fit exactly lengthwise and should never be shorter than the length thru bore (LTB) dimension of the hub. Align the key(s) in the shaft, then slide the hub onto the shaft. The key(s) should be flush with the end of the shaft and face of the hub.

4. **Straight Bore (Interference Fit)**: This is the default type of bore supplied by Lovejoy for disc coupling hubs. This installation is similar to Clearance Fit hubs except that these hubs need to be heated prior to sliding the hubs onto the shafts. It is important when installing Interference Fit hubs, to make sure clearance exists over the top of the key(s); otherwise, when the hub cools, the hub keyway will rest on the key and produce high stresses in the keyway that could cause the coupling to fail. To maintain dynamic balance, the key(s) should fit exactly lengthwise and should never be shorter than the length thru bore (LTB) dimension of the hub. Align the key(s) in the shaft, then slide the hub onto the shaft. The key(s) should be flush with the end of the shaft and face of the hub.

5. **Heat the hubs** and slide them on the shafts flanged end first as seen in the drawing at the end of this document. Make sure the hub is heated uniformly to a temperature of at least 350º. The following are suggestions to follow when heating hubs to mount with interference fits.

Oil Bath Heating is usually limited to 350º F. (177º C), or some temperature that is less than the flash point of the oil used. Special handling devices are required to support the hub in the oil bath such as tongs, threaded rods or eye-bolts placed in puller holes, etc. The hubs should not rest on the bottom of the oil bath container and must remain in place for a period of time ample to heat the hub all the way through.

Warning! *If an oil bath is used, the couplings will need to be heated to approximately 350º F (177º C) or more, so the oil must have a flash point above 350º F (177º C).*

Oven Heating offers definite advantages over oil bath heating. Parts can be heated to higher temperatures, usually not to exceed 600º F (315º C). This is roughly the maximum temperature where the metal does not go though an annealing process and yet can still be handled with heat resistant gloves. When heating the hubs in an oven, place them on a rack and do not rest the hubs on the oven surface. The hubs should remain in the oven for a period of time ample to heat the hub all the way through.

Induction Heating can be used and long as the temperature rise in the hub is uniform and controlled.

Open Flame Heating is typically not recommended. If the hub is being heated with an oxyacetylene, or blow torch, use an excess acetylene mixture. Mark the hub body at the top, center, and bottom along the length of the hub with heat resistant crayons, one with a 350º F (177º C) melt temperature and another with a 450º F (232º C) melt temperature. The hub should be sitting elevated on refractory bricks oriented to allow the flame to flow through the hub. With a "Blue Flame" or "Rosebud" torch, direct the flame towards the hub bore using constant motion to avoid overheating any single area. Once the heat sensitive crayon marks melt, the hub should be ready for mounting.

Warning! *Do not use an open flame in a combustible atmosphere or near combustible materials.*

CAUTION! Do not "spot" heat the hub in single areas or distortion of the hub could occur.

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CAUTION!	Do not exceed 600º F (315º C) during the heating process. Excessive heat can soften, or anneal the hub, reducing the strength of the steel thus affecting the performance characteristics of the hub.

CAUTION!	Use extreme care when handling heated hubs to avoid injury to personnel.

⚠ *Warning!*	*When installing the hub, consult with all applicable Federal, State, and local laws and regulations covering the safe operation and maintenance of equipment, including, without limitation, the USDOL-OSHA "Lockout/Tag-out" procedure set forth in 29 CFR 1910.147.*

SXCST COUPING ASSEMBLY

a. Once the hubs have been properly installed on the shafts, or while the hubs are cooling, the equipment can be moved into position and the shafts aligned (see Machinery Alignment – Page 4). Care must be taken to ensure the distance between the surfaces of the hubs equals the recommended BSE value specified in the chart located in Table 4.

b. With the hubs installed on the shafts and oriented as shown in the drawing at the end of this document, allow the hubs to cool to the ambient room temperature. Once the hubs have cooled, the disc packs can be mounted to the hubs.

c. Apply a light coating of grease to the flat face on each side of the disc pack bushings. This is necessary to keep the disc packs from binding while the locknuts are being tightened to the recommended torque settings. Without the lubricant, the bushings could twist causing the disc packs to buckle halfway between the bushings. Remove and reinstall the disc packs if excessive waviness or leaf separation occurs in the disc packs when tightening the bolts to the specified torque.

d. Mount the disc packs to each hub by inserting the three bolts for each disc pack through the flange face on the hub then through the disc pack. Then hand tighten the three locknuts against the disc pack bushings. **Do not torque** the locknuts at this time.

CAUTION!	DO NOT USE POWER TOOLS to tighten nuts onto disc pack bolts as this may cause friction welds.

e. Install the mounting rings to each disc pack by inserting the three bolts for each disc pack through the mounting ring, then the disc pack, and hand tighten the three locknuts. **Do not torque** the locknuts at this time.

f. Tighten all of the disc pack bolts and locknuts to the torque settings specified in Table 2. Either the hub side or the mounting ring side of the disc pack may be tightened first. Torque all three locknuts on same side of the disc pack before tightening locknuts on the opposite side to the specified torque.

Note: If room permits, always tighten the locknut, not the bolt since part of the tightening torque is needed to overcome friction. Normally additional friction is encountered when turning the bolt and more effort goes towards overcoming friction than into stretching the bolt.

g. Always remember to properly seat the bolt before tightening the locknut. Drawing the bolt through the flange and bushing by tightening the locknut could result in insufficient preloading of the bolt.

h. Locknuts should be tightened to the recommended torque specification in the following steps:

1. Tighten the locknuts to 25% of the recommended value in a crisscross pattern and continue tightening the locknuts by increasing the tightening torque by 25% in a crisscross pattern until reaching the recommended torque value.
2. Check the first locknut to verify it meets the torque specification. If it does not meet the specification continue tightening the locknuts in a crisscross pattern until reaching the recommended torque value.

Table 2 - Lovejoy Disc Pack Bolts & Locknuts

Size	Socket Size		Clearance Hole		Torque Wrench	Bolt Torque			
	Bolt Size	Nut Size	Diameter	Diameter	Drive Size	Lubricated Threads		Dry Threads	
	mm	mm	in	mm	in	ft-lbs	Nm	ft-lbs	Nm
090-6	10	10	0.63	16	1/4	8	11	10	14
110-6	13	13	0.827	21	3/8	18	24	22	30
132-6	13	13	0.827	21	3/8	18	24	22	30
158-6	17	15	1.024	26	3/8	35	48	44	60
185-6	19	18	1.26	32	3/8	59	80	74	100
202-6	22	21	1.378	35	1/2	89	120	111	150
228-6	24	24	1.457	37	1/2	136	184	170	230
255-6	30	30	1.772	45	3/4	266	360	332	450
278-6	30	30	1.811	46	3/4	266	360	332	450
302-6	32	32	1.968	50	3/4	354	480	443	600
325-6	32	32	2.047	52	3/4	354	480	443	600
345-6	36	36	2.205	56	3/4	460	624	575	780
380-6	41	41	2.362	60	1	649	880	811	1100
410-6	46	46	2.677	68	1	885	1200	1106	1500
440-6	50	50	2.913	74	1	1180	1600	1475	2000

Note: Please be advised that the Clearance Hole Diameter of the coupling may be smaller than the Outside Diameter of some typical sockets. The socket's OD may have to be turned down to 0.76 mm (0.030") smaller than the coupling's clearance hole diameter. For additional information, please contact Lovejoy's Application Engineering.

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i. If the equipment has not been moved into place, the driver and driven equipment should now be repositioned.

1. If the hubs were mounted flush with the ends of the driver and driven shafts, then position the equipment so that the actual shaft separation matches the BSE specified in Table 4.

2. If the hubs were not mounted flush with the end of the driver and driven shafts, then position the equipment with the distance between the mounting rings' flange faces equal to the length of the split spacer.

3. For either condition, the distance between the mounting rings flange faces must be the same as the length of the split spacer.

j. Mount the bottom half of the split spacer by inserting all the spacer bolts and hand tighten each of the locknuts. Do not torque the locknuts at this time.

k. Mount the top half of the split spacer by inserting all the spacer bolts and hand tighten each of the locknuts. Do not torque the locknuts at this time.

l. Torque all the Bolts on both sides of the split spacer following the tightening procedure in the following section.

SPACER BOLT TIGHTENING PROCEDURE

The spacer bolts should be tightened, per the following steps, to the recommended torque as specified in Table 3:

a. All bolts should be tightened in a crisscross fashion to one half of the torque value as specified in Table 3.

b. Once all bolts have been tightened to half of the torque tightening value, follow the same crisscross pattern and torque to the final torque value as specified in Table 3.

c. Finally, check the first bolts tightened to assure they have maintained the proper torque value after all locknuts have been tightened, if it does not meet the torque value specified in Table 3, follow the same crisscross pattern and torque all bolts again.

Table 3 - SXCST Spacer Bolts

Hub	Bolt		Tightening Torque			
			Dry		Lubricated	
Size	Qty & Size		ft-lbs	Nm	ft-lbs	Nm
090-6	12	M6 x 20	11	15	8.8	12
110-6	12	M8 x 25	26	35	21	28
132-6	12	M8 x 25	26	35	21	28
158-6	12	M10 x 30	51	69	41	55
185-6	12	M12 x 40	89	120	71	96
202-6	12	M14 x 45	140	190	112	152
228-6	12	M16 x 50	218	295	175	236
255-6	12	M20 x 60	428	580	343	464
278-6	12	M20 x 60	428	580	343	464
302-6	12	M22 x 70	575	780	460	624
325-6	12	--	--	--	--	--
345-6	24	--	Please consult with			--
380-6	24	--	Lovejoy Inc Engineering			--
410-6	24	--	regarding these sizes			--
440-6	24	--	--	--	--	--

MACHINERY ALIGNMENT

a. Optical methods of alignment (such as Laser) are highly recommended.

b. The useful life of any Disc Coupling is directly influenced by the operating misalignment. It is common knowledge that the better the alignment, the longer the coupling life. Even after the coupling has been placed in service, the alignment should be checked periodically. Even when a coupling is well aligned at installation, subsequent settling of foundations, shifting of equipment, etc., may cause the alignment to deteriorate.

c. Realignment of the equipment may not be necessary if all eight of the Disc Pack Width (PW) measurements defined in 'Step K' are within acceptable limits.

d. If the equipment can be realigned without much movement of the equipment (Only adding a few adjustment shims to the corners of the equipment), then the disc coupling may remain in place during the alignment procedure.

e. If major equipment movement is required, such as removing all adjustment shims from one or more corners of the equipment, then the disc spacer and disc packs should be removed prior to the alignment procedure and reinstalled after the equipment is aligned.

f. Soft Foot: The equipment must sit flat on its base. Any "soft foot" must be corrected prior to placing the coupling in service.

g. The Axial Displacement allowable between shafts during installation should not exceed 20% of the allowable displacement specified in Table 4. This displacement is a function of the coupling size and the number of bolts utilized. The larger the size, the larger the allowable axial displacement.

h. Axial displacement creates large stresses in the disc pack. For a long life, it is recommended that the axial spacing of the shafts should be positioned so that the disc pack is completely flat when the equipment is operating under normal conditions. This means there is a minimal amount of waviness in the disc pack when viewed from the side. This will result in a flexing element, or disc pack, that is properly centered and parallel to its mating flange faces. Move the connecting equipment or the hubs on their respective shafts to accomplish this.

i. Thermal expansion of the shafts should be carefully considered. Example: if the distance between shaft ends change by 0.015" (the shafts are coming closer to each other) as equipment heats up from cold to hot, the distance between shaft ends with the machinery still cold should intentionally be made larger by 0.015" when installing the coupling is installed.

j. Equipment should be checked for "Magnetic Centering" (Please see the Lovejoy Document "Magnetic Center Alignment" document available through Lovejoy Technical Support.

k. Measurements of the gap for the pack width (PW) should be made to ensure proper axial and angular alignment. This can be done with the disc packs in place. The PW dimension is the Gap between the mounting ring and the flange face on the hub (see the PW dimension in the drawing on page 5). These measurements should be taken using accurate calipers and the measurements should be recorded for each disc pack gap at four radial locations (approximately 3, 6, 9 & 12 O'clock) as the final step in the installation. If the PW dimensions at each suggested location on each disc pack gap are within the upper and lower limits specified in Table 4, the installation is complete.

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CAUTION!	When using the PW (Pack Width) measurement to determine the axial displacement, remember that the angular misalignment will have an effect on the PW measurement.

l. If the gap or PW dimensions as measured are not within the limits as specified in Table 4, calculate the average of the PW measurements for the driver and driven side of the coupling.

1. Calculate the difference between the recorded average PW value and the recommended PW value inTable 4 for the driver and driven sides of the coupling.

2. This represents the how much to adjust the hubs or equipment on each side of the coupling. A positive number indicates expanded disc packs and the need to move the hubs closer together. A negative number indicates compressed disc packs and the need to move the hubs further apart.

3. Even though the hubs do not need to be moved, if there is at least one PW measurement that is beyond the upper or lower limit, the equipment will need to be realigned.

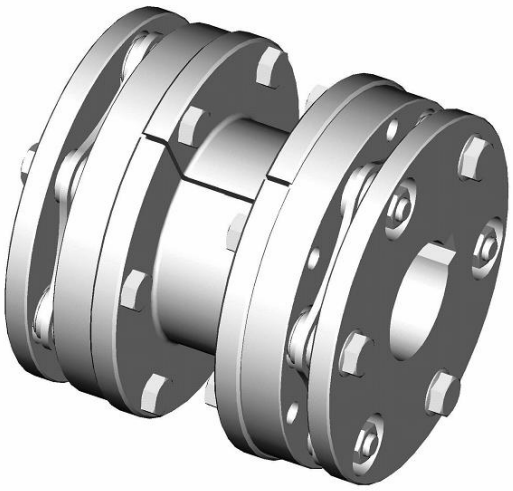
Warning! When reinstalling the coupling guard, verify there is enough clearance to prevent the coupling from coming in contact with the guard and that there's visibility to inspect the disc pack during operation.

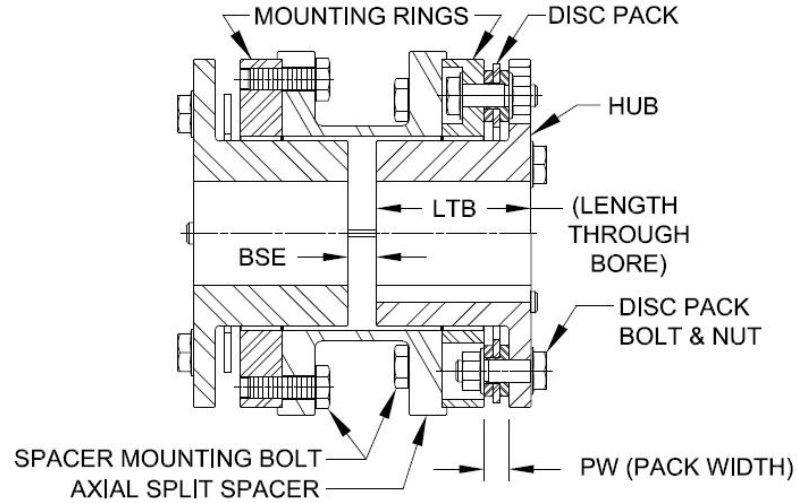
INSPECTION AND MAINTENANCE

For inspection or replacement of the disc packs see Lovejoy's "Disc Coupling Inspection & Maintenance Instructions" which can be found at http://www.lovejoy-inc.com in the Technical Resources / Installation Instructions section.

Table 4 - Axial Tolerance

Size	Axial Misalignment ±ΔKa in	Axial Misalignment ±ΔKa mm	Angular Misalign Max Degree	BSE Shaft Separation in	BSE Shaft Separation mm	Disk Pack Width (PW) - Gap: Standard Pack Width (PW) PW in	PW mm	Tolerance + / - in	Tolerance + / - mm	PW + / - Dimensions: Low in	Low mm	High in	High mm
090-6	0.030	0.75	1.5°	0.46	11.6	0.295	7.5	0.003	0.08	0.292	7.43	0.298	7.58
110-6	0.041	1.05		0.68	17.2	0.331	8.4	0.004	0.11	0.327	8.30	0.335	8.51
132-6	0.051	1.30		0.38	9.7	0.331	8.4	0.005	0.13	0.326	8.27	0.336	8.53
158-6	0.061	1.55		0.50	12.7	0.441	11.2	0.006	0.16	0.435	11.05	0.447	11.36
185-6	0.073	1.85		1.23	31.2	0.551	14.0	0.007	0.19	0.544	13.82	0.558	14.19
202-6	0.075	1.90	1°	1.00	25.4	0.610	15.5	0.007	0.19	0.603	15.31	0.617	15.69
228-6	0.083	2.10		1.40	35.6	0.689	17.5	0.008	0.21	0.681	17.29	0.697	17.71
255-6	0.093	2.35		2.23	56.6	0.807	20.5	0.009	0.24	0.798	20.27	0.816	20.74
278-6	0.102	2.60		1.47	37.3	0.835	21.2	0.010	0.26	0.825	20.94	0.845	21.46
302-6	0.112	2.85		2.19	55.6	0.961	24.4	0.011	0.29	0.950	24.12	0.972	24.69
325-6	0.128	3.25		1.10	28.0	1.024	26.0	0.013	0.33	1.011	25.68	1.037	26.33
345-6	0.136	3.45		1.18	30.0	1.110	28.2	0.014	0.35	1.096	27.86	1.124	28.55
380-6	0.150	3.80		1.34	34.0	1.260	32.0	0.015	0.38	1.245	31.62	1.275	32.38
410-6	0.161	4.10		1.38	35.0	1.307	33.2	0.016	0.41	1.291	32.79	1.323	33.61
440-6	0.173	4.40		1.50	38.0	1.433	36.4	0.017	0.44	1.416	35.96	1.450	36.84





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