



DETERMINATION OF SEATING AND UNSEATING
TORQUE BY APPLICATION CATEGORY
RESILIENT SEATS

With resilient seated valves there is a wide variation on the anticipated seating and unseating torque.

In order of importance, the following factors are those having the most effect on torque values.

- 1) **Lubrication Characteristics** – Lubricating oil is the best lubrication for metal/elastomer contact. The service may be dry or the lubricant in some seat compounds may be extracted by the flowing material handled. These are examples of both lubricating and non-lubricating services.

Non-Lubricating

- a) Dry gas
- b) Dry air
- c) Dry powder, dry blown cement, pellets
- d) Industrial solvents such as acetone, ethyl acetate
- e) Aromatic hydrocarbon such as JP jet fuels, diesel fuels

Lubricating

- a) Water
- b) Lubricating oil
- c) Aqueous process streams

- 2) **Temperature** – When the operating temperature approaches the upper limits of the seat material an increase in hardness of the seat may occur when condition lasts over a sustained period of time. An immediate increase in seat material hardness is noted when temperatures near the lower limits.

These temperature limits are:

Buna-N	=	0° F to 212° F
EPDM	=	-20° F to 300° F

- 3) **Flow Media** – Disc Edge – The disposition of materials on the seating surface in some cases raises the operating torque. Some examples are salts from brine solutions, calcium and other minerals in a “hard” water system.
- 4) Iron from uninhibited water systems. Any of these depositions may be corrosive or erosive to discs roughening the edge. This also increases the operating torque.
- 5) **Elastomer Chemical Attack** – Any chemical attack which causes the elastomer to swell will increase operating torque.

The varying torque factors that follow can be accommodated by reviewing the ABZ guides, categorical definitions, and “SEATING AND UNSEATING TORQUE” charts.

Category I

- Ideal Conditions
- temperature well within elastomer limits.
 - absences of chemicals.
 - Lubricating hydrocarbons.
 - absences of solids and disc corrosion media.
 - “exercise” operator once per day minimum.

Note: these category values to be used where 90° closure is not mandatory.

Category II

- Normal Conditions
- temperature within elastomer limits.
 - chemical damage to elastomer minor.
 - aqueous liquid lubricating media including salt water and lubricating gasses.
 - corrosive action on disc and solids depositions minor.
 - “exercise” operator once per month minimum.

Category III

- Severe Conditions
- temperatures may be outside elastomer limits.
 - unknown effect of chemical on elastomer.
 - non-lubricating media.
 - corrosive materials present and unknown degree of effect.
 - controller “exercise” at indefinite frequencies.

When Category III exists, it is necessary to select actuators after comparing “SEATING AND UNSEATING TORQUE” with “ALLOWABLE OPERATING TORQUE”. Impact loading may occur when actuators are not equipped with speed controls.



ABZ VALVES & CONTROLS SEATING/UNSEATING TORQUE CHART FULL CUT DISC - RUBBER SEATED

TABLE I

VALVE SIZE	IDEAL (OIL LUBRICATION)					NORMAL (WATER SERVICE)					SEVERE (DRY OR CAUSTIC)				
	$\Delta P=0$	$\Delta P=50$	$\Delta P=100$	$\Delta P=150$	$\Delta P=175$	$\Delta P=0$	$\Delta P=50$	$\Delta P=100$	$\Delta P=150$	$\Delta P=175$	$\Delta P=0$	$\Delta P=50$	$\Delta P=100$	$\Delta P=150$	$\Delta P=175$
1.5"	81	86	91	97	100	89	95	100	106	110	111	119	125	133	137
2"	109	114	119	123	128	184	192	200	208	212	311	320	333	338	342
2.5"	126	135	144	153	158	224	236	240	252	320	378	387	396	405	414
3"	149	171	189	207	216	268	284	304	316	327	450	473	491	509	528
4"	225	252	284	311	327	375	400	425	450	462	500	532	563	582	620
5"	306	356	401	450	473	544	588	628	672	712	769	838	907	944	1017
6"	522	612	711	756	783	793	840	924	1008	1050	980	1090	1200	1255	1368
8"	900	1089	1274	1374	1500	1260	1428	1596	1760	1846	2124	2376	2502	2691	2785
10"	1368	1652	1935	2310	2526	1932	2184	2916	2686	2810	3150	3500	3675	3825	4251
12"	1935	2412	2880	2928	3110	2970	3420	3870	4320	4545	4392	4865	5337	5809	6048
14"	*****	*****	*****	*****	*****	4300	5100	5900	6700	*****	6450	7250	8050	8650	*****
16"	*****	*****	*****	*****	*****	6400	6740	7700	9000	*****	8250	9450	10550	11850	*****
18"	*****	*****	*****	*****	*****	6900	8700	10500	12300	*****	10360	12150	13350	15750	*****
20"	*****	*****	*****	*****	*****	8500	11000	13500	15000	*****	12170	16250	17750	20250	*****
24"	*****	*****	*****	*****	*****	15000	15427	17000	18500	*****	19500	20055	22100	25000	*****
28"	*****	*****	*****	*****	*****	18000	19500	21200	23000	*****	23400	25350	27560	32000	*****
30"	*****	*****	*****	*****	*****	25100	27300	34100	36000	*****	32600	40950	44330	46800	*****
32"	*****	*****	*****	*****	*****	30100	32418	35073	38125	*****	39130	43143	47594	49563	*****
36"	*****	*****	*****	*****	*****	39000	40622	48000	68000	*****	50700	53000	62400	88400	*****
42"	*****	*****	*****	*****	*****	60000	69000	79000	89000	*****	78000	89700	102700	115700	*****
48"	*****	*****	*****	*****	*****	77000	93000	110000	135000	*****	100100	120900	143000	175000	*****

NOTES:

ADD 10% TO CHART FOR ACTUATOR TORQUE
 REVIEW BULLETIN 1000 FOR EXPLANATION OF SERVICE
 SEE TABLE II FOR SEATING/UNSEATING TORQUE ON UNDERCUT DISCS

ALL TORQUES SHOWN IN INCH POUNDS



TORQUE CHART IN INCH POUNDS UNDERCUT DISC - RUBBER SEATED

TABLE II

VALVE SIZE	IDEAL (OIL LUBRICATION)		NORMAL (WATER SERVICE)		SEVERE (DRY OR CAUSTIC)	
	$\Delta P=0$	$\Delta P=50$	$\Delta P=0$	$\Delta P=50$	$\Delta P=0$	$\Delta P=50$
1.5"	81	86	89	95	111	119
2"	109	114	120	125	151	157
2.5"	169	178	185	195	231	244
3"	220	236	245	260	306	325
4"	200	248	300	350	348	425
5"	324	374	410	460	480	560
6"	344	488	560	685	790	870
8"	735	894	900	980	1280	1500
10"	1204	1358	1463	1890	2110	2345
12"	1665	2074	1989	2490	3000	3500
14"	*****	*****	3132	3996	4176	5220
16"	*****	*****	3552	4800	5278	6480
18"	*****	*****	4512	6240	6768	8496
20"	*****	*****	5472	7872	8584	8900

NOTES:

ADD 10% TO CHART FOR ACTUATOR TORQUE
 REVIEW BULLETIN 1000 FOR EXPLANATION OF SERVICE
 SEE TABLE I FOR SEATING/UNSEATING TORQUE ON FULL CUT DISCS

ALL TORQUES SHOWN IN INCH POUNDS