



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 RUBBER SEATED STANDARD/FULL CUT DISC DIAMETER

VALVE SIZE	IDEAL CONDITIONS						NORMAL CONDITIONS						SEVERE CONDITIONS					
	$\Delta P = 0$	$\Delta P = 50$	$\Delta P = 100$	$\Delta P = 150$	$\Delta P = 175$	$\Delta P = 200$	$\Delta P = 0$	$\Delta P = 50$	$\Delta P = 100$	$\Delta P = 150$	$\Delta P = 175$	$\Delta P = 200$	$\Delta P = 0$	$\Delta P = 50$	$\Delta P = 100$	$\Delta P = 150$	$\Delta P = 175$	$\Delta P = 200$
1.5"	97	103	109	116			107	114	120	127			133	143	150	160		
2"	125	140	146	157	162	165	221	230	240	250	254	258	373	384	400	406	410	418
2.5"	151	162	173	184	190	194	269	283	288	302	311	317	454	464	475	486	497	507
3"	179	205	227	248	259	264	322	341	365	379	392	400	540	568	589	611	634	647
4"	270	302	341	373	392	400	480	514	542	576	590	602	816	848	886	918	936	955
5"	367	427	481	540	568	580	653	706	754	806	854	871	1,102	1,162	1,220	1,274	1,301	1327
6"	508	626	734	853	907	925	907	1,008	1,109	1,210	1,260	1,285	1,529	1,642	1,756	1,868	1,926	1965
8"	848	1,080	1,307	1,529	1,645	1,678	1,512	1,714	1,915	2,112	2,215	2,260	2,549	2,776	3,002	3,229	3,343	3410
10"	1,302	1,642	1,982	2,322	2,772	2,828	2,318	2,621	2,900	3,224	3,372	3,440	3,910	4,250	4,590	4,931	5,101	5203
12"	1,756	2,322	2,894	3,456	3,514	3,585	3,125	3,629	4,138	4,637	6,112	6,234	5,270	5,838	6,404	6,971	7,258	7403
14"							5,160	6,120	7,080	8,040			7,740	8,700	9,660	10,620		
16"							7,680	8,040	9,480	10,920			9,900	11,340	12,780	14,220		
18"							8,280	10,440	12,600	14,760			12,432	14,580	16,020	18,900		
20"							10,200	13,200	16,200	19,200			14,604	19,500	21,300	24,300		
24"							18,000	18,513	20,400	22,200			23,400	24,066	26,520	30,000		
30"							30,120	32,760	40,920	43,200			39,120	49,140	53,196	56,160		
36"							46,800	48,747	57,600	81,600			60,840	63,600	74,880	106,080		
42"							72,000	82,800	94,800	106,800			93,600	107,640	123,240	138,840		
48"							92,400	111,600	132,000	162,000			120,120	145,080	171,600	210,600		

ABZ RUBBER SEATED REDUCED/UNDERCUT DISC DIAMETER

VALVE SIZE	IDEAL CONDITIONS						NORMAL CONDITIONS						SEVERE CONDITIONS					
	$\Delta P = 0$	$\Delta P = 50$	$\Delta P = 100$	$\Delta P = 150$	$\Delta P = 175$	$\Delta P = 200$	$\Delta P = 0$	$\Delta P = 50$	$\Delta P = 100$	$\Delta P = 150$	$\Delta P = 175$	$\Delta P = 200$	$\Delta P = 0$	$\Delta P = 50$	$\Delta P = 100$	$\Delta P = 150$	$\Delta P = 175$	$\Delta P = 200$
4"	198	234					396	432					594	630				
5"	264	324					528	588					792	852				
6"	366	486					732	852					1,098	1,218				
8"	600	840					1,200	1,440					1,800	2,040				
10"	900	1,272					1,800	2,160					2,700	3,060				
12"	1,200	1,800					2,400	3,000					3,600	4,200				
14"							3,480	4,440					5,220	6,180				
16"							4,440	5,880					6,660	8,100				
18"							5,640	7,800					8,460	10,620				
20"							6,840	9,840					10,260	13,580				

**ALL TORQUES SHOWN IN INCH POUNDS
20% SAFETY FACTOR ALREADY INCLUDED**

**2"-12" 101/102/108 RATED TO 175 PSI w/ F/C DISC
REVIEW BULLITIN 1000 FOR EXPLANATION OF SERVICE**

**2"-12" 396/397 RATED TO 200 PSI
SUBJECT TO CHANGE WITHOUT NOTICE**