



# How To Size An EECO Valve



## Sizing An EECO Valve

We encourage you to have EECO size your valve. This assures proper valve sizing for your specific application. To have EECO size your valve, please fill out the form on pages 18 (for the UV-5AT/TC) or page 42 (for the UV-7B/BC) and fax it to EECO.

A major consideration for proper operation of a hydraulic elevator system is proper sizing of the control valve in that system. By valve sizing, we are only referring to the proper selection of the internal components of the valve, not to the physical size of the valve or the size of its ports.

If **down contract speed** (full down speed with rated load on the car) is the same as the up, then the size of the standard valve (either the UV-5AT or UV-7B) is determined by the size of the bypass piston only. Sizing of the bypass piston requires only static pressure and flow rate. Locating the intersection of static pressure and flow rate on the sizing charts provided in Figure 1 and Figure 3 (on pages 13 and 15) provides the size of the valve. If Down contract speed is different from the Up, please contact EECO.

If the valve is for an existing installation, then the static pressure can be read from a pressure gage installed in the jack (ram) gage port of the existing valve when the empty car is resting at the bottom landing. However, if the valve is for a new installation or static pressure can not be physically measured, then empty car weight (weight of everything above the platen plate plus 1/2 of the piston weight) and jack piston diameter are required. With this information on hand, you can then calculate the static pressure by dividing the empty car weight by the cross sectional area of the piston, or use Table 1A (or 1B, metric), provided on pages 8 (or 9), to obtain the static pressure.

If the flow rate is known, the valve can now be sized. However, if the flow rate is not known, the car speed and jack piston diameter are required. Table 2A (or 2B, metric), provided on pages 10 (or 11), can then be used to obtain the flow rate. The flow rate can also be calculated by multiplying the car speed by the displacement factor for the specified piston diameter provided in Table 3 on page 12.

As mentioned before, down contract speed is down speed with full load on the car. Down speed with empty car is less than contract speed depending on the ratio of full-load to no-load pressures (approximately 25% less for a two to one pressure ratio). If constant down speed is required between no-load and full-load conditions, UV-5ATC or UV-7BC valves should be used. Again, static pressure and flow rate are required to size the valve.

Size the Up (bypass) section of the **UV-5ATC** by using the sizing chart in Figure 1 (page 13). Then size the Down section of the **UV-5ATC** by using the sizing chart in Figure 2 (page 14).

Size the Up (bypass) section of the **UV-7BC** by using the sizing chart in Figure 3 (page 15). Then size the Down section of the **UV-7BC** by using the sizing chart in Figure 4 (page 16).

Sometimes changes in the system specification would make it necessary to modify the operating condition in the field. The change may require the size of an existing valve to be changed at the job. This means that the bypass, check and down pistons may have to be replaced. If the size of the valve is changed in the field, we recommend that you indicate the new valve size on top of the valve. This will prevent confusion when the valve is serviced in the future.



UV-7B - shown with optional 2.5" grooved connections.

If you still have questions on valve sizing, please call the **EECO Sales or Technical Support Departments**

and we'll help get you the right size valve for your application.

**(888) 577-EECO**

8:00 AM Eastern to 4:30 PM Pacific time, Monday through Friday, except holidays



**Table 1A - Pressure, PSI (for one jack)**

Load Above Piston - Pounds	Piston Diameter (Inches)																								
	2	2 1/2	2 3/4	3	3 7/16	3 1/2	3 7/8	4	4 3/8	4 1/2	5	5 7/16	5 1/2	6	6 1/2	7	7 1/2	8	8 1/2	9 1/2	10 5/8	12 5/8	13 7/8	15 7/8	
1000	318	204	168	141	108	104	85	80	67	63	51	43	42	35	30	26	23	20	18	14	11	8	7	5	1000
1500	477	306	253	212	162	156	127	119	100	94	76	65	63	53	45	39	34	30	26	21	17	12	10	8	1500
2000	637	407	337	283	216	208	170	159	133	126	102	86	84	71	60	52	45	40	35	28	23	16	13	10	2000
2500	796	509	421	354	269	260	212	199	166	157	127	108	105	88	75	65	57	50	44	35	28	20	17	13	2500
3000	955	611	505	424	323	312	254	239	200	189	153	129	126	106	90	78	68	60	53	42	34	24	20	15	3000
3500	1114	713	589	495	377	364	297	279	233	220	178	151	147	124	105	91	79	70	62	49	39	28	23	18	3500
4000		815	673	566	431	416	339	318	266	252	204	172	168	141	121	104	91	80	70	56	45	32	26	20	4000
4500		917	758	637	485	468	382	358	299	283	229	194	189	159	136	117	102	90	79	63	51	36	30	23	4500
5000		1019	842	707	539	520	424	398	333	314	255	215	210	177	151	130	113	99	88	71	56	40	33	25	5000
5500		1120	926	778	593	572	466	438	366	346	280	237	231	195	166	143	124	109	97	78	62	44	36	28	5500
6000			1010	849	647	624	509	477	399	377	306	258	253	212	181	156	136	119	106	85	68	48	40	30	6000
6500			1094	920	700	676	551	517	432	409	331	280	274	230	196	169	147	129	115	92	73	52	43	33	6500
7000				990	754	728	594	557	466	440	357	301	295	248	211	182	158	139	123	99	79	56	46	35	7000
7500				1061	808	780	636	597	499	472	382	323	316	265	226	195	170	149	132	106	85	60	50	38	7500
8000				1132	862	832	678	637	532	503	407	345	337	283	241	208	181	159	141	113	90	64	53	40	8000
8500					916	883	721	676	565	534	433	366	358	301	256	221	192	169	150	120	96	68	56	43	8500
9000					970	935	763	716	599	566	458	388	379	318	271	234	204	179	159	127	102	72	60	45	9000
9500					1024	987	806	756	632	597	484	409	400	336	286	247	215	189	167	134	107	76	63	48	9500
10000					1078	1039	848	796	665	629	509	431	421	354	301	260	226	199	176	141	113	80	66	51	10000
12000							1018	955	798	755	611	517	505	424	362	312	272	239	211	169	135	96	79	61	12000
14000								1114	931	880	713	603	589	495	422	364	317	279	247	198	158	112	93	71	14000
16000									1064	1006	815	689	673	566	482	416	362	318	282	226	180	128	106	81	16000
18000										1132	917	775	758	637	542	468	407	358	317	254	203	144	119	91	18000
20000											1019	861	842	707	603	520	453	398	352	282	226	160	132	101	20000
25000												1077	1052	884	753	650	566	497	441	353	282	200	165	126	25000
30000														1061	904	780	679	597	529	423	338	240	198	152	30000

Pressure (psi) = Load (lbs.) / (.7854 x (piston diameter in inches)<sup>2</sup>)



## Table 1B - Pressure, BAR (for one jack)

### Piston Diameter (Millimeters)

	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400	
200	6.9	3.9	2.5	1.7	1.3	1.0	0.8	0.6	0.5	0.4	0.4	0.3	0.3	0.2	0.2	0.2	0.2	0.2	200
400	13.9	7.8	5.0	3.5	2.6	2.0	1.5	1.3	1.0	0.9	0.7	0.6	0.6	0.5	0.4	0.4	0.3	0.3	400
600	20.8	11.7	7.5	5.2	3.8	2.9	2.3	1.9	1.5	1.3	1.1	1.0	0.8	0.7	0.6	0.6	0.5	0.5	600
800	27.8	15.6	10.0	6.9	5.1	3.9	3.1	2.5	2.1	1.7	1.5	1.3	1.1	1.0	0.9	0.8	0.7	0.6	800
1000	34.7	19.5	12.5	8.7	6.4	4.9	3.9	3.1	2.6	2.2	1.8	1.6	1.4	1.2	1.1	1.0	0.9	0.8	1000
1200	41.7	23.4	15.0	10.4	7.7	5.9	4.6	3.8	3.1	2.6	2.2	1.9	1.7	1.5	1.3	1.2	1.0	0.9	1200
1400	48.6	27.3	17.5	12.2	8.9	6.8	5.4	4.4	3.6	3.0	2.6	2.2	1.9	1.7	1.5	1.4	1.2	1.1	1400
1600	55.6	31.3	20.0	13.9	10.2	7.8	6.2	5.0	4.1	3.5	3.0	2.6	2.2	2.0	1.7	1.5	1.4	1.3	1600
1800	62.5	35.2	22.5	15.6	11.5	8.8	6.9	5.6	4.6	3.9	3.3	2.9	2.5	2.2	1.9	1.7	1.6	1.4	1800
2000	69.4	39.1	25.0	17.4	12.8	9.8	7.7	6.3	5.2	4.3	3.7	3.2	2.8	2.4	2.2	1.9	1.7	1.6	2000
2200	76.4	43.0	27.5	19.1	14.0	10.7	8.5	6.9	5.7	4.8	4.1	3.5	3.1	2.7	2.4	2.1	1.9	1.7	2200
2400		46.9	30.0	20.8	15.3	11.7	9.3	7.5	6.2	5.2	4.4	3.8	3.3	2.9	2.6	2.3	2.1	1.9	2400
2600		50.8	32.5	22.6	16.6	12.7	10.0	8.1	6.7	5.6	4.8	4.1	3.6	3.2	2.8	2.5	2.3	2.0	2600
2800		54.7	35.0	24.3	17.9	13.7	10.8	8.8	7.2	6.1	5.2	4.5	3.9	3.4	3.0	2.7	2.4	2.2	2800
3000		58.6	37.5	26.0	19.1	14.6	11.6	9.4	7.7	6.5	5.5	4.8	4.2	3.7	3.2	2.9	2.6	2.3	3000
3200		62.5	40.0	27.8	20.4	15.6	12.3	10.0	8.3	6.9	5.9	5.1	4.4	3.9	3.5	3.1	2.8	2.5	3200
3400		66.4	43.5	29.5	21.7	16.6	13.1	10.6	8.8	7.7	6.3	5.4	4.7	4.6	3.7	3.3	2.9	2.7	3400
3600		70.3	45.0	31.3	23.0	17.6	13.9	11.3	9.3	7.8	6.7	5.7	5.0	4.2	3.9	3.5	3.1	2.8	3600
3800		74.2	47.5	33.0	24.2	18.6	14.7	11.9	9.8	8.2	7.0	6.1	5.3	4.6	4.1	3.7	3.3	3.0	3800
4000		78.1	50.0	34.7	25.5	19.5	15.4	12.5	10.3	8.7	7.5	6.4	5.6	4.9	4.3	3.9	3.5	3.1	4000
4500			56.3	39.1	28.7	22.0	17.4	14.1	11.6	9.8	8.3	7.2	6.3	5.5	4.9	4.3	3.9	3.5	4500
5000			62.5	43.4	31.9	24.4	19.3	15.6	12.9	10.9	9.2	8.0	6.9	6.1	5.4	4.8	4.3	3.9	5000
5500			68.8	47.7	35.1	26.9	21.2	17.2	14.2	11.9	10.2	8.8	7.6	6.7	5.9	5.3	4.8	4.3	5500
6000			75.0	52.1	38.3	29.3	23.1	18.8	15.5	13.0	11.1	9.6	8.3	7.3	6.5	5.8	5.2	4.7	6000
7000				60.8	44.6	34.3	27.0	21.9	18.1	15.2	12.9	11.2	9.7	8.5	7.6	6.8	6.1	5.5	7000
8000				69.4	51.0	39.1	30.9	25.0	20.7	17.4	14.8	12.8	11.1	9.8	8.7	7.7	6.9	6.3	8000
9000				78.1	57.4	43.9	34.7	28.1	23.2	19.5	16.6	14.3	12.5	11.0	9.7	8.7	7.8	7.0	9000
10000					63.8	48.8	38.6	31.3	25.8	21.7	18.5	15.9	13.9	12.2	10.8	9.6	8.7	7.8	10000
15000						73.2	57.9	46.9	38.7	32.6	27.7	23.9	20.8	18.3	16.2	14.5	13.0	11.7	15000
20000							77.2	62.5	51.7	43.4	37.0	31.9	27.8	24.4	21.6	19.3	17.3	15.6	20000

Pressure (BAR) = Load (kg) / (.008 x (piston diameter in mm)<sup>2</sup>)





## Table 2A - Flow Rate (gallons per minute, gpm)

### Car Speed - Feet Per Minute (fpm)

	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
2	2	3	5	7	8	10	11	13	15	16	18	20	21	23	24	26	28	29	31	33
2 1/2	3	5	8	10	13	15	18	20	23	25	28	31	33	36	38	41	43	46	48	51
2 3/4	3	6	9	12	15	19	22	25	28	31	34	37	40	43	46	49	52	56	59	62
3	4	7	11	15	18	22	26	29	33	37	40	44	48	51	55	59	62	66	70	73
3 7/16	5	10	14	19	24	29	34	39	43	48	53	58	63	67	72	77	82	87	92	96
3 1/2	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
3 7/8	6	12	18	25	31	37	43	49	55	61	67	74	80	86	92	98	104	110	116	123
4	7	13	20	26	33	39	46	52	59	65	72	78	85	91	98	104	111	117	124	131
4 3/8	8	16	23	31	39	47	55	62	70	78	86	94	102	109	117	125	133	141	148	156
4 1/2	8	17	25	33	41	50	58	66	74	83	91	99	107	116	124	132	140	149	157	165
5	10	20	31	41	51	61	71	82	92	102	112	122	133	143	153	163	173	184	194	204
5 7/16	12	24	36	48	60	72	84	96	109	121	133	145	157	169	181	193	205	217	229	241
5 1/2	12	25	37	49	62	74	86	99	111	123	136	148	160	173	185	197	210	222	234	247
6	15	29	44	59	73	88	103	117	132	147	162	176	191	206	220	235	250	264	279	294
6 1/2	17	34	52	69	86	103	121	138	155	172	190	207	224	241	259	276	293	310	327	345
7	20	40	60	80	100	120	140	160	180	200	220	240	260	280	300	320	340	360	380	400
7 1/2	23	46	69	92	115	138	161	184	207	229	252	275	298	321	344	367	390	413	436	459
8	26	52	78	104	131	157	183	209	235	261	287	313	339	366	392	418	444	470	496	522
8 1/2	29	59	88	118	147	177	206	236	265	295	324	354	383	413	442	472	501	531	560	590
9 1/2	37	74	110	147	184	211	258	295	331	368	405	442	479	515	552	589	626	663	700	736
10 5/8	46	92	138	184	230	276	322	368	415	461	507	553	599	645	691	737	783	829	875	921
12 5/8	65	130	195	260	325	390	455	520	585	650	715	780	845	910	975	1040	1105	1170	1236	1301
13 7/8	79	157	236	314	393	471	550	628	707	785	864	942	1021	1100	1178	1257	1335	1414	1492	1571
15 7/8	103	206	308	411	514	617	720	823	925	1028	1131	1234	1337	1439	1542	1645	1748	1851	1953	2056
17 7/8	130	261	391	521	652	782	912	1043	1173	1304	1434	1564	1695	1825	1955	2086	2216	2346	2477	2607

Jack Piston Diameter (Inches)

**NOTE:** Flow rate (gallons per minute, gpm) = car speed (feet per minute, fpm) x displacement (gallons per foot, gpf)  
 Displacement (gallons per foot, gpf) = 0.0408 x (piston O. D. in inches)<sup>2</sup>





## Table 2B - Flow Rate (liter per minute, lpm)

### Car Speed - Meters Per Minute (Mpm)

Jack Piston Diameter (Millimeters)

	1	2	3	4	5	6	7	8	9	10	15	20	25	30	35	40	45	50	55	60	65
60	3	6	10	13	16	19	22	25	29	32	48	63	79	95	111	127	143	158	174	190	206
80	4	8	12	15	19	23	27	31	35	38	58	77	96	115	134	153	173	192	211	230	249
100	5	9	14	18	23	27	32	36	41	46	68	91	114	137	160	182	205	228	251	273	296
120	5	11	16	22	27	33	38	44	49	55	82	109	137	164	191	218	246	273	300	328	355
140	6	12	19	25	31	37	43	50	56	62	93	124	155	186	217	248	279	310	341	372	403
160	8	15	23	30	38	46	53	61	69	76	114	152	190	228	266	305	343	381	419	457	495
180	8	16	24	32	41	49	57	65	73	81	122	162	203	243	284	324	365	406	446	487	527
200	10	19	29	39	48	58	68	78	87	97	145	194	242	291	339	388	436	485	533	582	630
220	10	21	31	41	51	62	72	82	92	103	154	205	256	308	359	410	462	513	564	615	667
240	13	25	38	51	63	76	89	101	114	127	190	253	317	380	443	507	570	633	697	760	823
260	15	30	45	60	75	90	105	120	135	150	225	300	374	449	524	599	674	749	824	899	974
280	15	31	46	61	77	92	107	123	138	153	230	307	383	460	536	613	690	766	843	920	996
300	18	36	55	73	91	109	128	146	164	182	274	365	456	547	639	730	821	912	1003	1095	1186
320	22	45	67	89	122	134	156	178	201	223	335	446	558	669	781	892	1004	1115	1227	1338	1450
340	25	50	74	99	124	149	174	199	223	248	372	497	621	745	869	993	1117	1241	1365	1490	1614
360	29	57	86	114	143	171	200	228	257	285	428	570	713	855	998	1140	1283	1425	1568	1710	1853
380	32	65	97	130	162	195	227	259	292	324	486	649	811	973	1135	1297	1459	1621	1783	1946	2108
400	37	73	110	146	183	220	256	293	329	366	549	732	915	1098	1281	1464	1647	1830	2013	2196	2379

**NOTE:** Flow rate (liters per minute, lpm) = car speed (meters per minute, Mpm) x displacement (liters per meter, lpM)  
 Displacement (liters per meter, lpM) = 0.0007854 x (piston O. D. in mm)<sup>2</sup>





## Table 3 - Piston Data

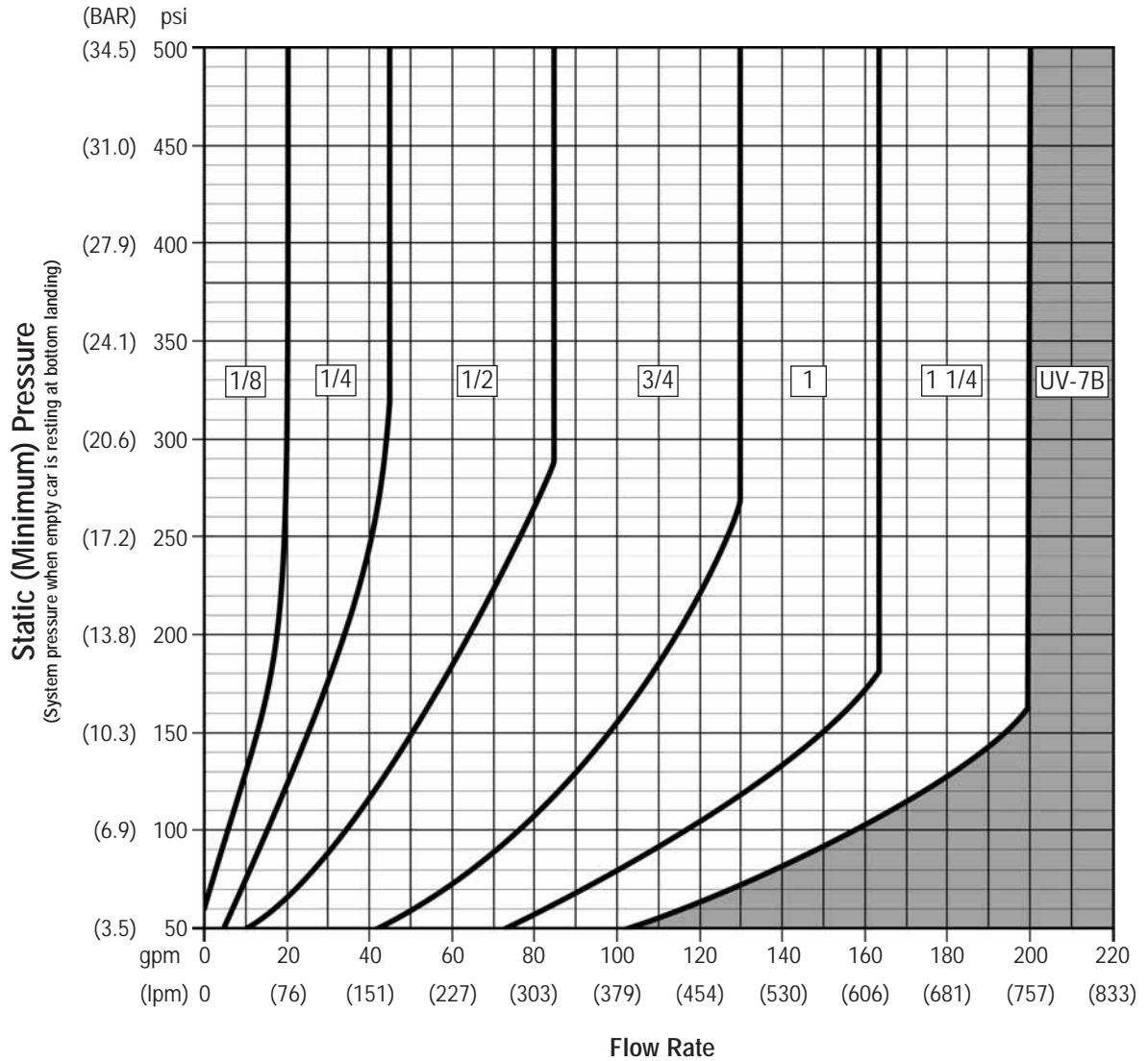
PISTON DIAMETER		PISTON AREA		DISPLACEMENT	
INCHES	MILLIMETERS	IN <sup>2</sup>	CM <sup>2</sup>	GALLONS PER FOOT (gpf)	LITERS PER METER (lpm)
2	50.80	3.142	20.268	0.163	2.026
2 1/4	57.15	3.976	25.652	0.207	2.565
2 1/2	63.50	4.909	31.669	0.255	3.166
2 3/4	69.85	5.94	38.320	0.309	3.831
3	76.20	7.069	45.604	0.367	4.559
3 7/16	87.31	9.28	59.87	0.482	5.986
3 1/2	88.90	9.621	62.072	0.500	6.206
3 3/4	95.25	11.045	71.256	0.574	7.124
3 7/8	98.43	11.793	76.085	0.613	7.607
4	101.60	12.566	81.073	0.653	8.106
4 1/4	107.95	14.186	91.524	0.737	9.150
4 3/8	111.13	15.033	96.987	0.781	9.697
4 1/2	114.30	15.904	102.608	0.826	10.259
4 3/4	120.65	17.721	144.326	0.921	11.430
5	127.00	19.635	126.677	1.020	12.665
5 1/4	133.35	21.648	139.661	1.125	13.963
5 7/16	138.11	23.221	149.815	1.206	14.978
5 1/2	139.70	23.758	153.279	1.234	15.325
5 3/4	146.05	25.967	167.530	1.349	16.749
6	152.40	28.274	182.415	1.469	18.238
6 1/4	158.75	30.680	197.933	1.594	19.789
6 1/2	165.10	33.183	214.084	1.724	21.404
6 3/4	171.45	35.785	230.869	1.859	23.082
7	177.80	38.485	248.287	1.999	24.823
7 1/2	190.50	44.179	285.023	2.295	28.496
7 3/4	196.85	47.173	304.341	2.451	30.428
8	203.20	50.265	324.293	2.611	32.422
8 1/2	215.90	56.745	366.096	2.948	36.602
8 3/4	222.25	60.132	387.948	3.124	38.787
9	228.60	63.617	410.433	3.305	41.035
9 1/2	241.30	70.882	457.303	3.682	45.721
9 3/4	247.65	74.662	481.689	3.879	48.159
10	254.00	78.540	506.707	4.080	50.660
10 1/4	260.35	82.516	532.360	4.287	53.225
10 1/2	266.70	86.590	558.645	4.498	55.853
10 5/8	269.88	88.664	572.025	4.606	57.190
10 3/4	273.05	90.763	585.564	4.715	58.544
11	279.40	95.033	613.116	4.937	61.299
11 1/4	285.75	99.402	641.302	5.164	64.117
11 1/2	292.10	103.869	670.121	5.396	66.998
11 3/4	298.45	108.434	699.573	5.633	69.942
12	304.80	113.097	729.659	5.875	72.950
12 1/4	311.15	117.859	760.378	6.123	76.022
12 1/2	317.50	122.718	791.730	6.375	79.156
12 5/8	320.68	125.185	807.644	6.503	80.747
13 7/8	352.43	151.201	975.491	7.855	97.528
15 7/8	403.23	197.933	1276.982	10.282	127.671
17 7/8	454.03	250.947	1619.010	13.036	161.867

**NOTE:** Gallons per Minute (gpm) or Liters per Minute (lpm) = Displacement (gpf or lpm) x Car Speed (fpm or Mpm)



# Figure 1 Sizing Chart for UV-5AT (Standard Valve)

Note: Also use this chart to size the "Up Section" of the UV-5ATC (Constant Down Speed valve) only.  
To size the "Down Section" of the UV-5ATC, please use Figure 2.



BP adjuster @ 12 turns open & 150 SSU oil @ 100° F (38° C).

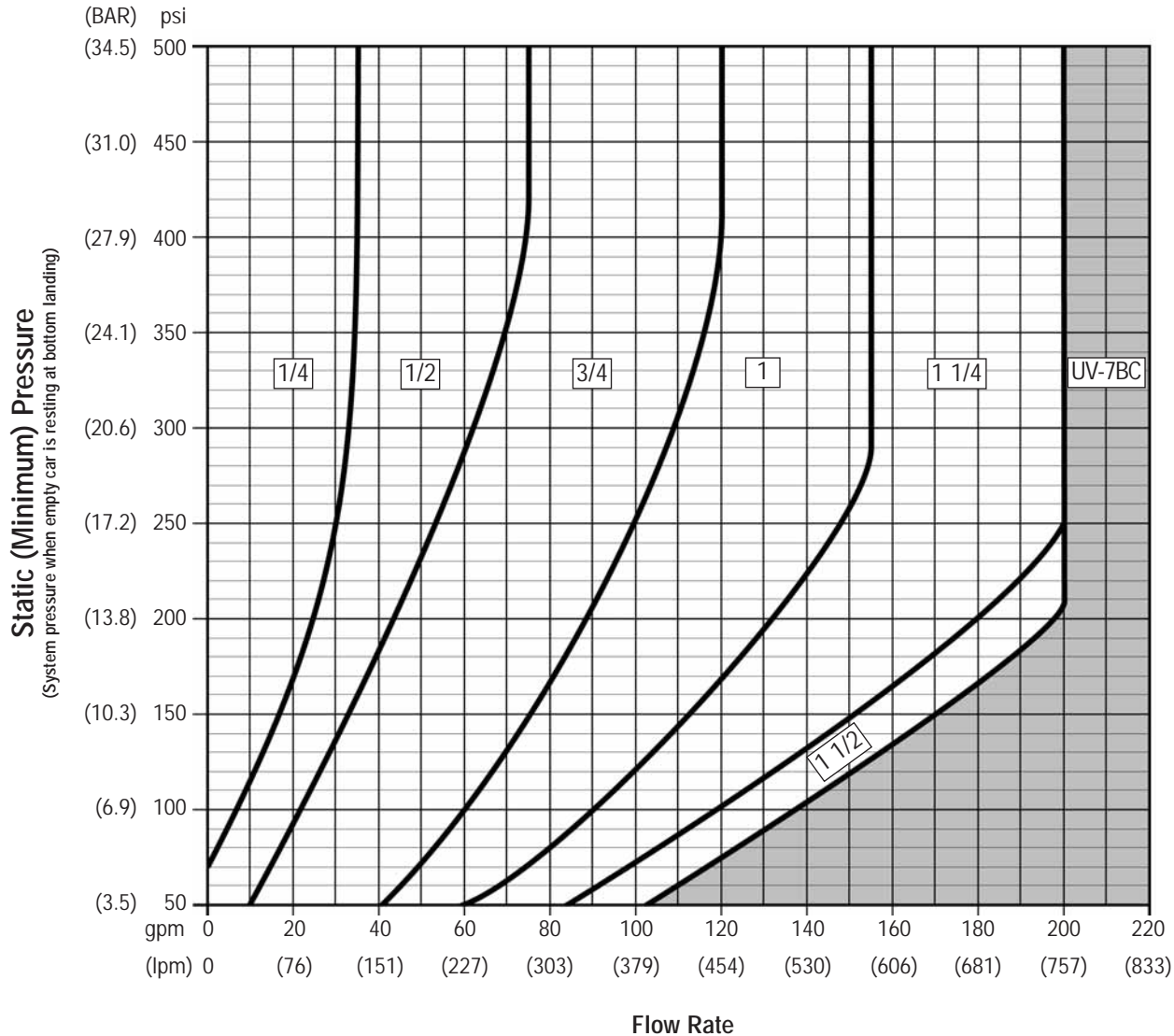
- NOTES:**
1. The point of intersection of "Static Pressure" and "Flow Rate" identifies the correct valve size.
  2. It is assumed that Up and Down contract speeds are the same. If the Down contract speed is different from the Up, contact EECO.
  3. **Down contract speed** is full down speed with rated load on the car.

**CAUTION:** When adjusting the **UV-5AT** valve, set the empty car down speed at 25% **LESS** than the down contract speed. If constant down speed is required between no-load and full-load conditions, use the **UV-5ATC** valve.



# Figure 2 Sizing Chart for Down Section Of UV-5ATC Only (Constant Down Speed Valve)

Note: To Size UV-5AT (Standard Valve), or the "Up Section" of the UV-5ATC (Constant Down Speed Valve), please use Figure 1.

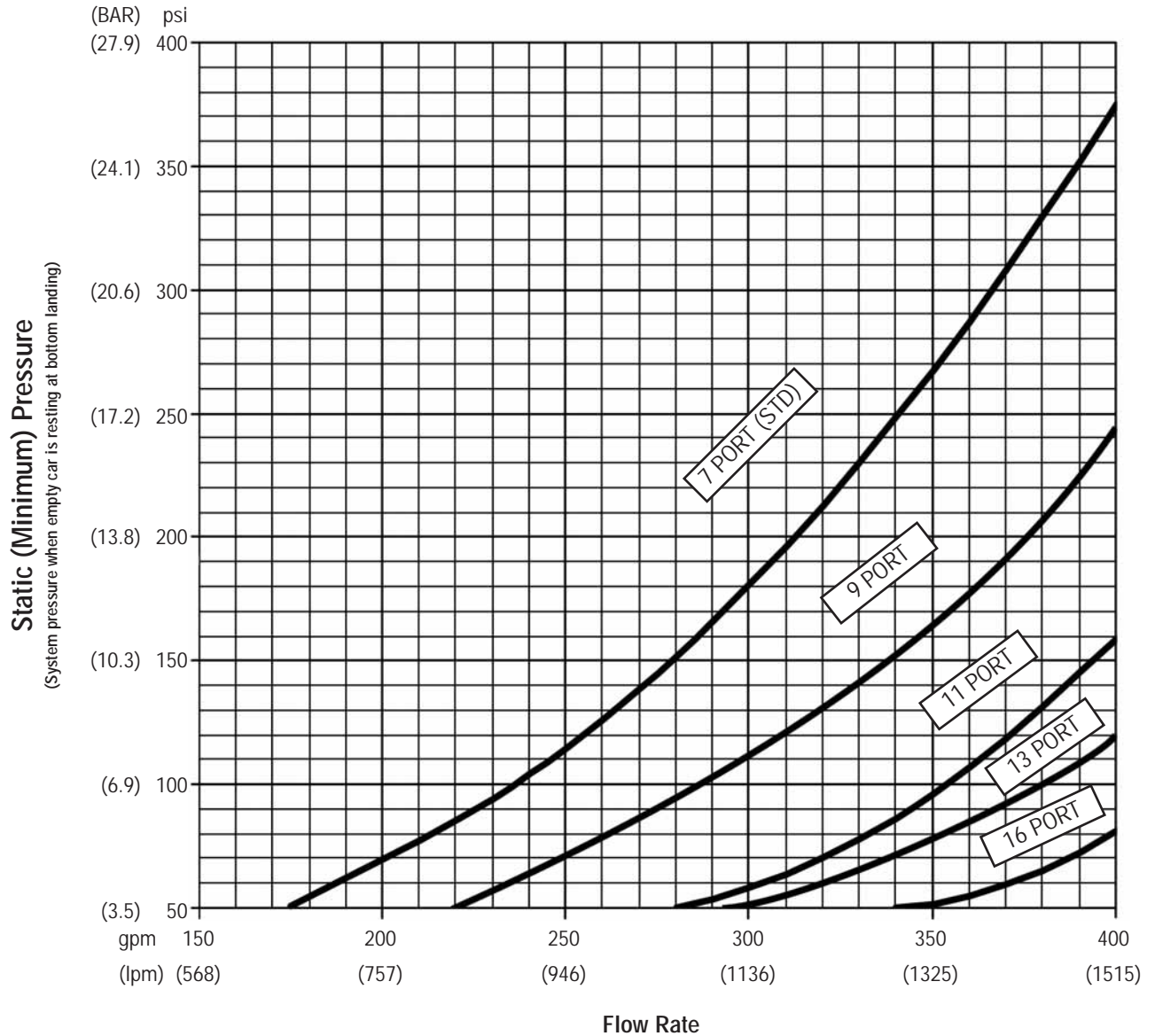


NOTE: The point of intersection of "Static Pressure" and "Flow Rate" identifies the correct valve size.



### Figure 3 Sizing Chart for UV-7B (Standard Valve)

**Note:** Also use this chart to size the "Up Section" of the UV-7BC (Constant Down Speed Valve) only.  
To size the "Down Section" of the UV-7BC, please use Figure 4.



BP Adjuster @ 10 Turns Open & 150 SSU Oil @ 100° F (38° C).

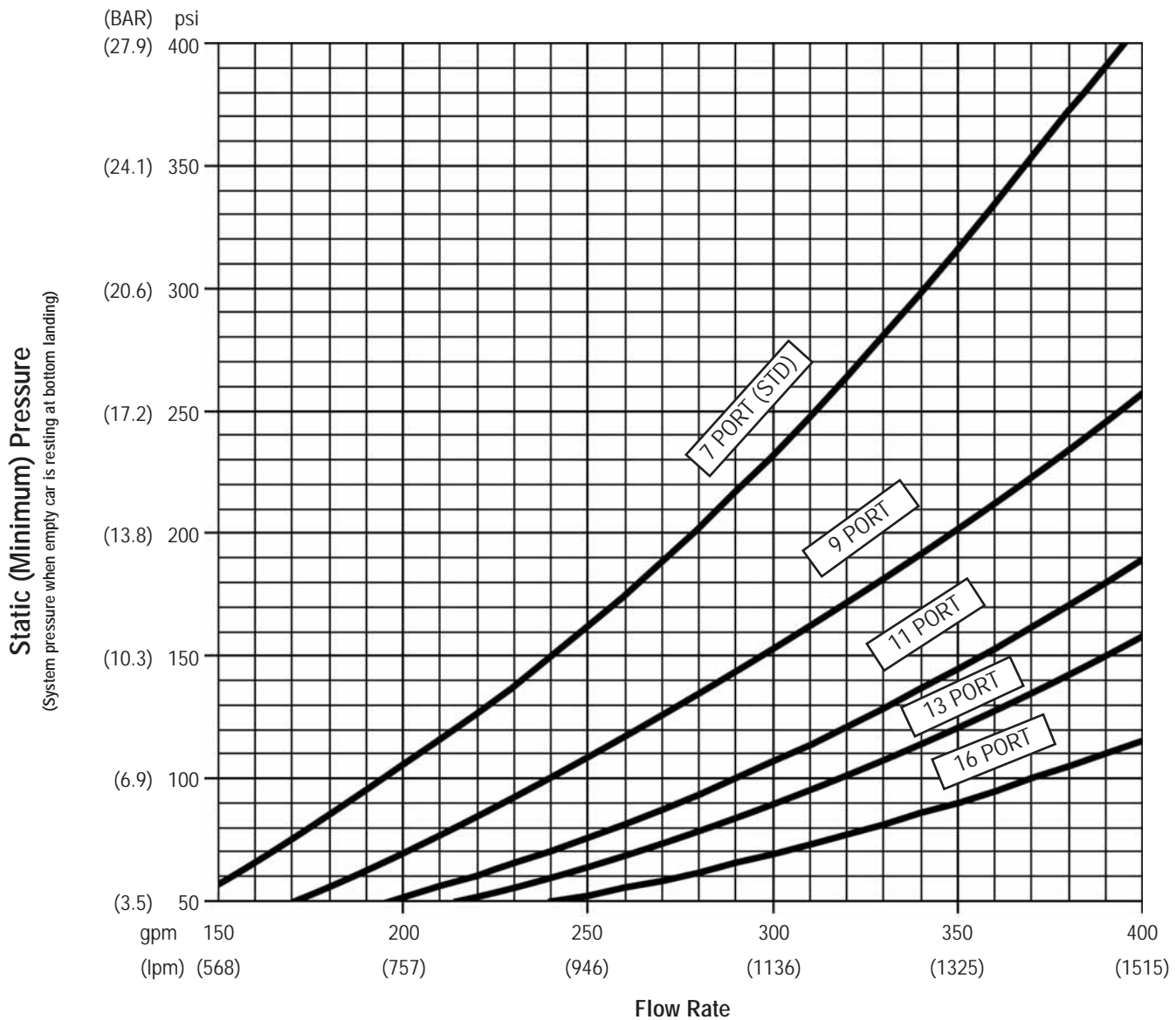
- NOTES:**
1. The point of intersection of "Static Pressure" and "Flow Rate" identifies the correct valve size.
  2. It is assumed that Up and Down contract speeds are the same. If the Down contract speed is different from the Up, contact EECO.
  3. **Down contract speed** is full down speed with rated load on the car.

**CAUTION:** When adjusting the **UV-7B** valve, set the empty car down speed at 25% **LESS** than the down contract speed. If constant down speed is required between no-load and full-load conditions, use the **UV-7BC** valve.



# Figure 4 Sizing Chart for Down Side of UV-7BC Only (Constant Down Speed Valve)

Note: To Size UV-7B (Standard Valve), or the "Up Section" of the UV-7BC (Constant Down Speed Valve), please use Figure 3.



NOTE: The point of intersection of "Static Pressure" and "Flow Rate" identifies the correct valve size.