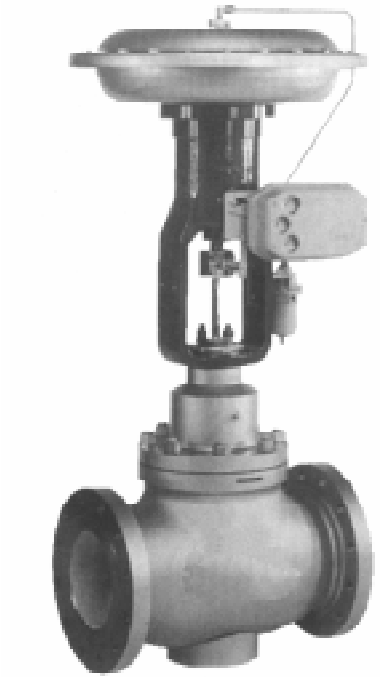
POLNA®

CAGE CONTROL VALVES
Z91-6933



FUNCTION

The Z91-6933 control valves are supplied with globe body, single seat and quick change type cage trim.
They can suit applications which require higher performances than the ones of Z91-6911 series valves provided with conventional trim, mainly for high pressure drops at open and closed valve.
The flows is mainly controlled by the special cage drilling, which acts as a continuous and full plug guide along the whole valve travel.
Furthermore the high pressure recovery factor value allows to obtain higher flow rates, the Cv factor being equal, and to reduce the cavitation risk on liquid service.
On gas and vapour service the single cage Z91-6933 valve is less noisy, compared with an equivalent version provided with conventional trim and operating under the same conditions.
Furthermore low noise trims are available, which further reduce the noise generated by the valve, and multicage trims for service on cavitating fluids ot on high differential pressures.

MAIN FEATURES

BODY

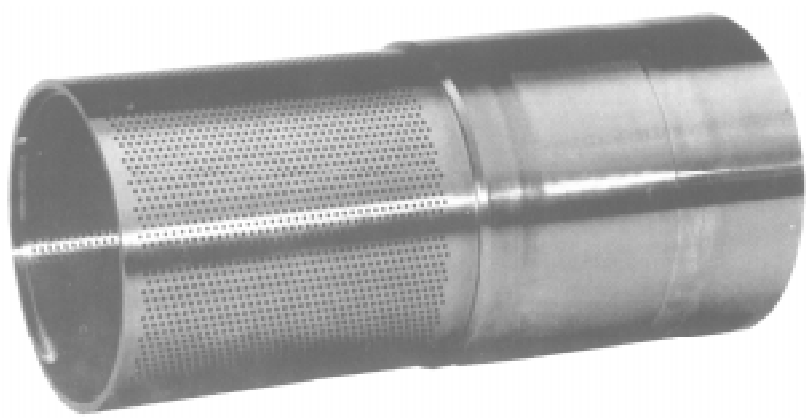
- type: globe, single port, not invertible
- construction: cast
- material: standard from stock:
  carbon steel WCB type and AISI 316 stainless steel
  other materials on request:
  carbon steel LCB type, Cr-Mo alloyed steels, AISI 316L stainless steel
- sizes: 1" through 16"
- connections:
  - screwed ANSI B2.1 up to DN 2" included
  - UNI, ANSI, DIN flanged
  - socket welding up to DN 2" included
  - BW ANSI B16.25 butt welding ends
- ratings:
  - PN 250 ANSI 1500 for socket welding construction up to DN 2"
  - PN 100 ANSI 600 for screwed construction up to DN 2"
  - PN 10/16/25/40/64/100/150/250
  ANSI 150/300/600/900/1500 for butt welding and flanged construction

BONNET

- type: plain, extended and bellows seal finned on request
- construction: flanged type, forged or welding assembled
- materials: same as for body in the coresponding forged or rolled construction
- packing: graphited teflon split rings or pure graphite rings

PLUG

- sizes: full or reduced ports as per Cv table
- type: standard or balanced; balanced with soft seat for 2" sizes and above
- guiding: by the cage all along the travel
- materials: see material list



SEAT

- mounting: free fitted in the body without screwing or forcing.
  Centered in the cage to grant the alignment with the plug.
  Body and seat coupling sealed by means of a flat gasket
- materials: see material list

CAGE

- construction: rolled or forged cylinder drilled and tightened between body and bonnet.
  Multicage available, beside the standard single cage (standard and low noise type GBR) series
- materials: see material list
- drilling: linear and exponential characteristics available

SEAT LEAKAGE (IEC 534-4 classes)

- standard non-balanced construction: class IV.
  Class V on request.

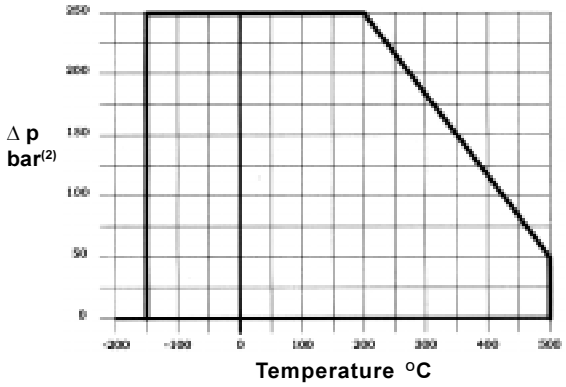
- balanced construction with teflon sealing on the plug:
  class IV.
  Class V on request.

- balanced construction with graphite sealing on the plug:
  class IV.

- balanced construction with graphoil sealing on the plug:
  class IVS1.

BASIC RATING OF 1-6933 SERIES VALVES (1)

The valve rating is referred to the standard construction supplied with AISI 321 + graphite gaskets.



(1) These ratings are independent from body and trim ratings.
(2) Refer to the upstream pressure when the fluid enters through the cage (side inlet).

MULTICAGE TRIM
Approximate values of pressure recovery factor F_L and of pressure differential ratio factor x_T

Number of cages	F_L	x_T
2	0,955	0,81
3	0,975	0,86

Values are approximately valid for all models and for both flow directions.

SINGLE CAGE TRIM - LINEAR CHARACTERISTIC
Flow coefficients Cv for ratings 150 ÷ 600 (1) (2)

DN		Port	Seat dia.	Travel	Travel %										
mm	cal	[cal]	[mm]	[mm]	5	10	20	30	40	50	60	70	80	90	100
25	1	3/4	20	17	0,26	0,61	1,66	3,1	4,5	6,0	7,4	8,7	10,3	11,4	11,9
		1/2	14	17	0,17	0,45	1,23	2,0	2,8	3,5	4,4	5,2	6,0	6,6	7,2
40	1,1/2	1,1/2	38	34	0,77	2,3	6,2	10,3	14,4	18,4	23	27	29	32	34
		1	28	25	0,58	1,60	4,5	7,8	10,8	13,4	16,2	19,0	21	23	24
		3/4	20	25	0,26	0,28	2,5	4,1	5,6	7,3	9,2	11,0	12,4	13,7	15
50	2	2	47,5	34	1,00	2,8	8,1	13,1	19,5	26	32	38	43	45	48
		1,1/2	38	34	0,77	2,3	6,1	10,1	14,0	17,8	22	26	31	36	38
		1	28	25	0,58	1,60	4,5	7,8	10,8	13,4	16,3	19,2	22	24	26
80	3	3	73,5	45	2,0	6,4	20	36	52	68	85	101	114	122	129
		2	47,5	34	1,00	4,0	13,4	22	30	37	45	53	61	66	72
		1,1/2	38	34	0,77	2,3	6,1	10,1	14,0	17,8	22	26	31	37	42
100	4	4	95	60	2,7	8,9	28	54	78	108	135	160	176	188	200
		3	73,5	45	2,0	6,4	20	35	51	66	82	97	113	128	143
		2	47,5	34	1,00	4,0	13,4	22	30	37	45	53	61	67	72
150	6	6	127	76	4,6	16,2	52	99	147	203	251	300	344	367	385
		5	112	76	3,9	14,6	46	80	113	145	176	207	239	272	302
		4	95	60	2,7	8,9	28	53	76	104	131	154	183	208	235
		3	73,5	45	2,0	6,4	20	35	51	66	82	97	114	130	145
200	8	8	162	100	6,9	27	89	170	256	331	402	477	544	578	610
		7	147	100	6,2	24	77	139	201	253	306	360	412	463	510
		6	127	76	4,6	16,1	51	97	143	196	242	292	340	385	430
		5	112	76	3,9	14,6	46	80	113	145	176	207	241	275	307
		4	95	60	2,7	8,9	28	53	76	104	131	154	183	209	238
250	10	10	216	100	10,8	46	157	304	422	563	666	777	869	918	975
		9	186	100	9,3	24	140	246	346	444	536	620	709	785	840
		8	162	100	6,9	27	88	167	249	320	392	471	547	613	685
		7	147	100	6,2	24	77	139	201	253	306	363	420	478	537
		6	127	76	4,6	16	51	97	143	196	242	292	342	389	435
300	12	12	244	100	13,8	58	197	349	494	650	783	922	1049	1180	1305
		10	216	100	10,8	45	155	298	410	546	653	770	884	987	1105
		9	186	100	9,3	42	140	246	346	444	538	626	719	804	895
		8	162	100	6,9	27	88	167	249	320	392	472	550	619	695
		7	147	100	6,2	24	77	139	201	253	306	363	420	479	540
350	14	14	293	150	18,8	87	289	482	686	895	1089	1318	1529	1656	1755
		13	266	150	16,7	77	265	445	637	823	990	1155	1312	1447	1525
		12	244	100	13,8	57	195	342	479	626	748	877	994	1118	1235
		10	216	100	10,8	45	155	298	410	546	653	770	888	991	1110
		9	186	100	9,3	42	140	246	346	444	538	626	719	806	900
400	16	16	343	200	27	119	378	649	936	1266	1556	1824	2065	2193	2310
		15	323	200	23	98	325	550	791	1034	1276	1509	1755	1956	2045
		14	293	150	18,8	86	286	472	666	862	1045	1261	1455	1660	1860
		13	266	150	16,7	77	265	445	637	823	993	1164	1323	1476	1635
		12	244	100	13,8	57	195	342	479	626	748	877	998	1127	1245

(1) Values valid also for ANSI 900÷1500 ratings up to DN 12" (reduced ports only up to DN 8")
(2) The valve rangeability can be calculated as $Cv_{(100\%)} / Cv_{(5\%)}$

Pressure recovery factor F_L and pressure differential ratio factor x_T

DN		Port	Travel 10%		Travel 100%	
mm	in.	[in.]	F_L	x_T	F_L	x_T
25	1	3/4	0,94	0,78	0,92	0,72
		1/2	0,94	0,78	0,92	0,72
40	1,1/2	1,1/2	0,94	0,78	0,92	0,73
		1	0,94	0,78	0,92	0,72
		3/4	0,94	0,78	0,92	0,72
50	2	2	0,94	0,78	0,92	0,73
		1,1/2	0,94	0,78	0,91	0,71
		1	0,94	0,78	0,91	0,70
80	3	3	0,94	0,78	0,92	0,72
		2	0,94	0,78	0,91	0,70
		1,1/2	0,94	0,78	0,90	0,69
100	4	4	0,94	0,78	0,92	0,73
		3	0,94	0,78	0,90	0,69
		2	0,94	0,78	0,91	0,70
150	6	6	0,94	0,78	0,92	0,72
		5	0,94	0,78	0,90	0,69
		4	0,94	0,78	0,90	0,68
		3	0,94	0,78	0,90	0,68
200	8	8	0,94	0,78	0,92	0,72
		7	0,94	0,78	0,91	0,70
		6	0,94	0,78	0,90	0,69
		5	0,94	0,78	0,90	0,68
		4	0,94	0,78	0,90	0,68

DN		Port	Travel 10%		Travel 100%	
mm	in.	in.	F_L	x_T	F_L	x_T
250	10	10	0,94	0,78	0,92	0,72
		9	0,94	0,78	0,91	0,70
		8	0,94	0,78	0,90	0,69
		7	0,94	0,78	0,90	0,68
		6	0,94	0,78	0,90	0,68
300	12	12	0,94	0,78	0,90	0,69
		10	0,94	0,78	0,90	0,68
		9	0,94	0,78	0,90	0,68
		8	0,94	0,78	0,90	0,68
		7	0,94	0,78	0,90	0,68
350	14	14	0,94	0,78	0,91	0,72
		13	0,94	0,78	0,91	0,70
		12	0,94	0,78	0,90	0,68
		10	0,94	0,78	0,90	0,68
		9	0,94	0,78	0,90	0,68
400	16	16	0,94	0,78	0,92	0,73
		15	0,94	0,78	0,91	0,71
		14	0,94	0,78	0,90	0,68
		13	0,94	0,78	0,90	0,68
		12	0,94	0,78	0,90	0,68

SINGLE CAGE TRIM - EXPONENTIAL CHARACTERISTIC
Flow coefficients Cv for ratings 150 ÷ 600 (1) (2)

DN		Port [in.]	Seat dia. [mm]	Travel [mm]	Travel %										
mm	in.				5	10	20	30	40	50	60	70	80	90	100
25	1	3/4	20	17	0,26	0,47	1,00	1,8	2,6	3,8	5,1	6,4	8,0	9,5	11,2
		1/2	14	17	0,17	0,31	0,67	1,1	1,7	2,3	3,0	3,9	4,8	5,7	6,4
40	1,1/2	1,1/2	38	34	0,77	1,5	3,1	5,4	8,2	11,6	16	21	27	30	32
		1	28	25	0,58	1,02	2,0	3,5	5,3	7,2	10,4	14,0	17,3	21	24
		3/4	20	25	0,26	0,47	1,2	2,1	3,1	4,5	5,9	8,0	10,3	12,1	13,6
50	2	2	47,5	34	1,00	1,9	4,0	6,4	10,7	15	22	28	35	44	51
		1,1/2	38	34	0,77	1,5	3,0	5,3	8,0	11,2	15	20	25	31	37
		1	28	25	0,58	1,02	2,0	3,5	5,3	7,2	10,4	14,0	17	21	24
80	3	3	73,5	45	2,0	4,2	10	17	27	38	54	71	87	104	116
		2	47,5	34	1,00	2,2	5,3	8,8	15,0	21	30	37	45	53	60
		1,1/2	38	34	0,77	1,5	3,0	5,3	8,0	11,2	15	20	26	32	38
100	4	4	95	60	2,7	5,2	12	23	38	59	85	112	142	168	180
		3	73,5	45	2,0	4,1	10	17	27	37	52	67	83	99	114
		2	47,5	34	1,00	2,2	5,3	8,8	15,0	21	30	37	45	53	60
150	6	6	127	76	4,6	10,1	25	51	83	128	174	226	276	322	360
		5	112	76	3,9	8,9	22	40	59	87	119	153	192	233	272
		4	95	60	2,7	5,1	11	23	37	57	82	107	135	161	190
		3	73,5	45	2,0	4,1	10	17	27	37	52	67	83	99	115
200	8	8	162	100	6,9	15	39	80	136	201	286	370	446	512	570
		7	147	100	6,2	15	37	70	109	148	198	256	314	381	450
		6	127	76	4,6	10,0	25	50	81	123	166	215	265	311	360
		5	112	76	3,9	8,9	22	40	59	87	119	153	192	234	275
		4	95	60	2,7	5,1	11	23	37	57	82	107	135	161	191
250	10	10	216	100	10,8	24	61	130	208	337	468	596	710	813	900
		9	186	100	9,3	21	54	109	177	277	383	471	561	644	735
		8	162	100	6,9	15	39	79	132	194	274	354	443	501	575
		7	147	100	6,2	15	37	70	109	148	198	256	314	386	462
		6	127	76	4,6	10	2	50	81	123	166	215	265	311	365
300	12	12	244	100	13,8	36	101	189	313	453	601	750	883	1020	1145
		10	216	100	10,8	24	60	127	202	325	447	571	689	795	915
		9	186	100	9,3	21	54	109	177	277	383	471	564	650	745
		8	162	100	6,9	15	39	79	132	194	274	354	433	502	580
		7	147	100	6,2	15	37	70	109	148	198	256	314	386	465
350	14	14	293	150	18,8	44	111	217	355	555	770	1027	1242	1472	1640
		13	266	150	16,7	39	106	195	317	468	667	893	1091	1282	1460
		12	244	100	13,8	36	100	185	304	437	574	711	832	958	1075
		10	216	100	10,8	24	60	127	202	325	447	571	689	796	920
		9	186	100	9,3	21	54	109	177	277	383	471	564	650	745
400	16	16	343	200	27	67	171	326	507	733	1357	1412	1768	2068	2200
		15	323	200	23	51	133	240	390	583	823	1078	1375	1695	1960
		14	293	150	18,8	44	110	213	344	534	736	795	1178	1384	1590
		13	266	150	16,7	39	106	195	317	468	667	893	1098	1292	1495
		12	244	100	13,8	36	100	185	304	437	574	711	832	960	1080

(1) Values valid also for ANSI 900÷1500 ratings up to DN 12" (reduced ports only up to DN 8")
(2) The valve rangeability can be calculated as $Cv_{(100\%)} / Cv_{(5\%)}$

Pressure recovery factor F_L and pressure differential ratio factor x_T

DN		Port in.	Travel 10%		Travel 100%	
mm	in.		F_L	x_T	F_L	x_T
25	1	3/4	0,94	0,78	0,90	0,69
		1/2	0,94	0,78	0,91	0,70
40	1,1/2	1,1/2	0,94	0,78	0,92	0,73
		1	0,94	0,78	0,91	0,70
		3/4	0,94	0,78	0,91	0,71
50	2	2	0,94	0,78	0,91	0,71
		1,1/2	0,94	0,78	0,90	0,69
		1	0,94	0,78	0,91	0,69
80	3	3	0,94	0,78	0,91	0,70
		2	0,94	0,78	0,90	0,68
		1,1/2	0,94	0,78	0,90	0,68
100	4	4	0,94	0,78	0,91	0,71
		3	0,94	0,78	0,90	0,68
		2	0,94	0,78	0,90	0,68
150	6	6	0,94	0,78	0,91	0,70
		5	0,94	0,78	0,90	0,68
		4	0,94	0,78	0,90	0,68
		3	0,94	0,78	0,90	0,68
200	8	8	0,94	0,78	0,91	0,71
		7	0,94	0,78	0,90	0,69
		6	0,94	0,78	0,90	0,68
		5	0,94	0,78	0,90	0,68
		4	0,94	0,78	0,90	0,68

DN		Port in.	Travel 10%		Travel 100%	
mm	in.		F_L	x_T	F_L	x_T
250	10	10	0,94	0,78	0,91	0,70
		9	0,94	0,78	0,90	0,68
		8	0,94	0,78	0,90	0,68
		7	0,94	0,78	0,90	0,68
		6	0,94	0,78	0,90	0,68
300	12	12	0,94	0,78	0,90	0,68
		10	0,94	0,78	0,90	0,68
		9	0,94	0,78	0,90	0,68
		8	0,94	0,78	0,90	0,68
		7	0,94	0,78	0,90	0,68
350	14	14	0,94	0,78	0,90	0,69
		13	0,94	0,78	0,90	0,69
		12	0,94	0,78	0,90	0,67
		10	0,94	0,78	0,90	0,68
		9	0,94	0,78	0,90	0,68
400	16	16	0,94	0,78	0,91	0,71
		15	0,94	0,78	0,90	0,69
		14	0,94	0,78	0,90	0,68
		13	0,94	0,78	0,90	0,68
		12	0,94	0,78	0,90	0,68

SINGLE CAGE TRIM - GBR TYPE
Flow coefficients Cv for ratings 150 ÷ 600 (1) (2)

DN		Port [in.]	Seat dia. [mm]	Travel [mm]	Travel %										
mm	cal				5	10	20	30	40	50	60	70	80	90	100
25	1	3/4	20	17	0,26	0,68	2,05	3,5	4,9	6,3	7,7	9,0	10,3	11,4	11,8
		1/2	14	17	0,17	0,49	1,39	2,3	3,1	3,9	4,7	5,5	6,1	6,6	7,0
40	1,1/2	1,1/2	38	34	0,78	2,3	6,5	10,7	14,8	18,7	22	26	28	30	32
		1	28	25	0,58	1,57	4,3	7,1	9,9	12,4	14,8	17,1	19,6	22	23
		3/4	20	25	0,26	0,90	3,0	5,0	6,8	8,7	10,5	12,1	13,3	14,3	15
50	2	2	47,5	34	1,00	3,2	8,7	13,9	19,6	25	30	35	40	42	45
		1,1/2	38	34	0,78	2,3	6,4	10,5	14,4	18,1	22	25	29	32	35
		1	28	25	0,58	1,57	4,3	7,1	9,9	12,4	14,8	17,2	20	22	24
80	3	3	73,5	45	2,0	9,2	27	45	63	79	95	110	118	125	130
		2	47,5	34	1,00	3,3	11,0	18,8	26,2	33	40	46	53	60	65
		1,1/2	38	34	0,78	2,3	6,4	10,5	14,4	18,1	22	25	29	32	36
100	4	4	95	60	2,7	15,3	42	69	97	122	146	167	178	189	200
		3	73,5	45	2,0	9,1	26	44	61	76	91	106	121	135	147
		2	47,5	34	1,00	3,3	11,0	18,8	26,2	33	40	46	53	60	65
150	6	6	127	76	4,6	27,3	77	126	178	223	268	312	349	372	390
		5	112	76	3,9	21,5	59	96	134	176	200	231	263	294	322
		4	95	60	2,7	15,2	41	68	94	118	141	164	188	210	230
		3	73,5	45	2,0	9,1	26	44	61	76	91	107	122	137	151
200	8	8	162	100	6,9	43	122	203	284	356	422	488	545	579	610
		7	147	100	6,2	34	94	155	215	270	322	373	421	469	510
		6	127	76	4,6	27,1	76	124	173	216	258	301	342	383	420
		5	112	76	3,9	21,5	59	69	134	167	200	233	266	298	329
		4	95	60	2,7	15,2	41	68	94	118	141	164	188	211	234
250	10	10	216	100	10,8	67	186	308	431	551	654	756	850	909	955
		9	186	100	9,3	55	151	248	347	437	521	602	685	767	830
		8	162	100	6,9	43	120	198	276	345	413	481	546	612	675
		7	147	100	6,2	34	94	155	215	270	323	376	428	481	531
		6	127	76	4,6	27	76	124	173	216	258	301	343	386	425
300	12	12	244	100	13,8	76	212	349	489	634	766	895	1023	1147	1370
		10	216	100	10,8	67	184	302	419	532	635	739	838	938	1035
		9	186	100	9,3	55	151	248	347	437	523	6,7	694	779	865
		8	162	100	6,9	43	120	198	276	345	413	482	550	619	685
		7	147	100	6,2	34	94	155	215	270	323	376	428	482	535
350	14	14	293	150	18,8	121	337	556	778	997	1191	1389	1567	1666	1755
		13	266	150	16,7	107	305	502	696	875	1041	1206	1373	1489	1555
		12	244	100	13,8	76	209	342	475	610	732	851	967	1079	1190
		10	216	100	10,8	67	184	302	419	532	635	739	841	942	1040
		9	186	100	9,3	55	15	248	347	437	523	607	694	780	865
400	16	16	343	200	27	178	494	822	1154	1459	1748	2015	2151	2254	2355
		15	323	200	23	155	425	696	967	1223	1451	1679	1897	2011	2085
		14	293	150	18,8	121	332	544	755	961	1147	1327	1506	1684	1855
		13	266	150	16,7	107	305	502	696	875	1046	1217	1384	1549	1715
		12	244	100	13,8	76	209	342	475	610	732	851	970	1087	1200

(1) Values valid also for ANSI 900÷1500 ratings up to DN 12" (reduced ports only up to DN 8")
(2) The valve rangeability can be calculated as $Cv_{(100\%)} / Cv_{(5\%)}$

Pressure recovery factor F_L and pressure differential ratio factor x_T

DN		Port in.	Travel 10%		Travel 100%	
mm	in.		F_L	x_T	F_L	x_T
25	1	3/4	0,94	0,78	0,94	0,77
		1/2	0,94	0,78	0,94	0,77
40	1,1/2	1,1/2	0,94	0,78	0,94	0,78
		1	0,94	0,78	0,94	0,77
		3/4	0,94	0,78	0,94	0,78
50	2	2	0,94	0,78	0,94	0,77
		1,1/2	0,94	0,78	0,93	0,76
		1	0,94	0,78	0,93	0,76
80	3	3	0,94	0,78	0,94	0,78
		2	0,94	0,78	0,93	0,76
		1,1/2	0,94	0,78	0,93	0,76
100	4	4	0,94	0,78	0,94	0,78
		3	0,94	0,78	0,93	0,76
		2	0,94	0,78	0,93	0,76
150	6	6	0,94	0,78	0,94	0,78
		5	0,94	0,78	0,93	0,76
		4	0,94	0,78	0,93	0,76
		3	0,94	0,78	0,93	0,76
200	8	8	0,94	0,78	0,94	0,78
		7	0,94	0,78	0,93	0,76
		6	0,94	0,78	0,93	0,76
		5	0,94	0,78	0,93	0,76
		4	0,94	0,78	0,93	0,76

DN		Port in.	Travel 10%		Travel 100%	
mm	in.		F_L	x_T	F_L	x_T
250	10	10	0,94	0,78	0,94	0,78
		9	0,94	0,78	0,93	0,76
		8	0,94	0,78	0,93	0,76
		7	0,94	0,78	0,93	0,76
		6	0,94	0,78	0,93	0,76
300	12	12	0,94	0,78	0,93	0,76
		10	0,94	0,78	0,93	0,76
		9	0,94	0,78	0,93	0,76
		8	0,94	0,78	0,93	0,76
		7	0,94	0,78	0,93	0,76
350	14	14	0,94	0,78	0,94	0,77
		13	0,94	0,78	0,94	0,77
		12	0,94	0,78	0,93	0,76
		10	0,94	0,78	0,93	0,76
		9	0,94	0,78	0,93	0,76
400	16	16	0,94	0,78	0,94	0,78
		15	0,94	0,78	0,94	0,77
		14	0,94	0,78	0,93	0,76
		13	0,94	0,78	0,93	0,76
		12	0,94	0,78	0,93	0,76

MAXIMUM PRESSURE DROPS - bar - NON BALANCED PLUG - ANSI 150÷600

	PORT	Travel [mm]	Diaphragm cat.I					Diaphragm cat.II					Diaphragm cat.III				
			310	390	450	600	600L	310	390	450	600	600L	310	390	450	600	600L
Cl IV Packing A	1/2"	17	38					85					100				
	3/4"	17	18					42					100				
	3/4"	25	17					45					100				
	1"	25	8,4	16				22	37				56	100			
	1 1/2"	34		8	12				20	31				55	82		
	2"	34		4,8	7,9				12	19				35	52		
	3"	45		1,8	3,0				5,4	8,4				14	22		
	4"	60			1,6	3,6				5,1	8,6				9,9	23	
	5"	76				2,4					6,2					16	
	6"	76				1,8					4,8					12	
	7"	100					1					3,5					9,9
	8"	100					- -					2,9					8,1
	9"	100					- -					2,1					6,1
	10"	100					- -					1,5					4,4
	12"	100					- -					1,1					3,4
Cl IV Packing B	1/2"	17	32					79					100				
	3/4"	17	15					39					100				
	3/4"	25	14					41					100				
	1"	25	6,8	13				21	35				55	98			
	1 1/2"	34		6,9	11				19	30				54	81		
	2"	34		4,1	7				12	19				34	51		
	3"	45		1,5	2,7				5,1	8				14	22		
	4"	60			1,4	3,2				4,9	8,2				9,7	22	
	5"	76				2,1					6					16	
	6"	76				1,6					4,6					12	
	7"	100					- -					3,3					9,7
	8"	100					- -					2,7					7,9
	9"	100					- -					2					5,9
	10"	100					- -					1,4					4,4
	12"	100					- -					1,1					3,4
Cl V Packing A	1/2"	17	20					67					100				
	3/4"	17	10					33					100				
	3/4"	25	4,1					31					100				
	1"	25	- -	6,4				13	28				47	91			
	1 1/2"	34		1	5,8				13	24				48	75		
	2"	34		- -	1,4				6,3	13				28	46		
	3"	45		- -	- -				1,5	4,5				10	18		
	4"	60			- -	- -				2,2	5,7				7	20	
	5"	76				- -					3					13	
	6"	76				- -					2					10	
	7"	100					- -					1,1					7,5
	8"	100					- -					- -					5,9
	9"	100					- -					- -					3,9
	10"	100					- -					- -					2,6
	12"	100					- -					- -					1,8
Cl V Packing B	1/2"	17	14					61					100				
	3/4"	17	6,9					30					100				
	3/4"	25	1					28					100				
	1"	25	- -	4,3				11	26				45	89			
	1 1/2"	34		- -	4,4				12	23				46	74		
	2"	34		- -	- -				5,5	12				27	45		
	3"	45		- -	- -				1,2	4,1				10	18		
	4"	60			- -	- -				2	5,3				6,8	19	
	5"	76				- -					2,8					13	
	6"	76				- -					1,8					9,9	
	7"	100					- -					- -					7,3
	8"	100					- -					- -					5,7
	9"	100					- -					- -					3,8
	10"	100					- -					- -					2,5
	12"	100					- -					- -					1,7

NOTE

Values listed in table refer to max Δp for closed valve with flow under the plug and atmospheric downstream pressure.

- Values are limited to 100 bar for ANSI 150÷600.
- Packing "A" = VTP, TFG type.
- Packing "B" = VTC, VTP2, VPV, GRF, GRFV type.

BALANCED PLUG WITH TEFLON SEAL ANSI 150÷600
Seat leakage V - packing A

Port [in.]	Travel [mm]	Diaphragm												Cylinders							
		cat. I				cat. II				cat. III				cat. I		cat. II		cat. III		cat. IV	
		390	450	600	600L	390	450	600	600L	390	450	600	600L	300	450	300	450	300	450	300	450
2"	34	- -	- -			100	100			100	100										
3"	45	- -	- -			22	100			100	100										
4"	60		- -	- -			100	100			100	100									
5"	76			- -				100				100									
6"	76			- -				100				100									
7"	100				- -				12				100								
8"	100				- -				- -				100								
9"	100				- -				- -				100								
10"	100				- -				- -				100								
12"	100				- -				- -				100								
13"	150													- -		- -		100		100	
14"	150													- -		- -		48		100	
15"	200													- -	100	- -	100	10	100	71	100
16"	200													- -	100	- -	100	- -	100	40	100

BALANCED PLUG WITH GRAPHOIL SEAL ANSI 150÷600
Seat leakage IVS1 - packing B

Port [in.]	Travel [mm]	Diaphragm												Cylinders							
		cat. I				cat. II				cat. III				cat. I		cat. II		cat. III		cat. IV	
		390	450	600	600L	390	450	600	600L	390	450	600	600L	300	450	300	450	300	450	300	450
2"	34	18	49			100	100			100	100										
3"	45	- -	49			100	100			100	100										
4"	60		10	100			100	100			100	100									
5"	76			86				100				100									
6"	76			86				100				100									
7"	100				- -				100				100								
8"	100				- -				100				100								
9"	100				- -				100				100								
10"	100				- -				100				100								
12"	100				- -				74				100								
13"	150													100		100		100		100	
14"	150													86		100		100		100	
15"	200													52	100	100	100	100	100	100	100
16"	200													35	100	86	100	100	100	100	100

BALANCED PLUG WITH GRAPHITE SEAL ANSI 150÷600
Seat leakage IV - packing A-B

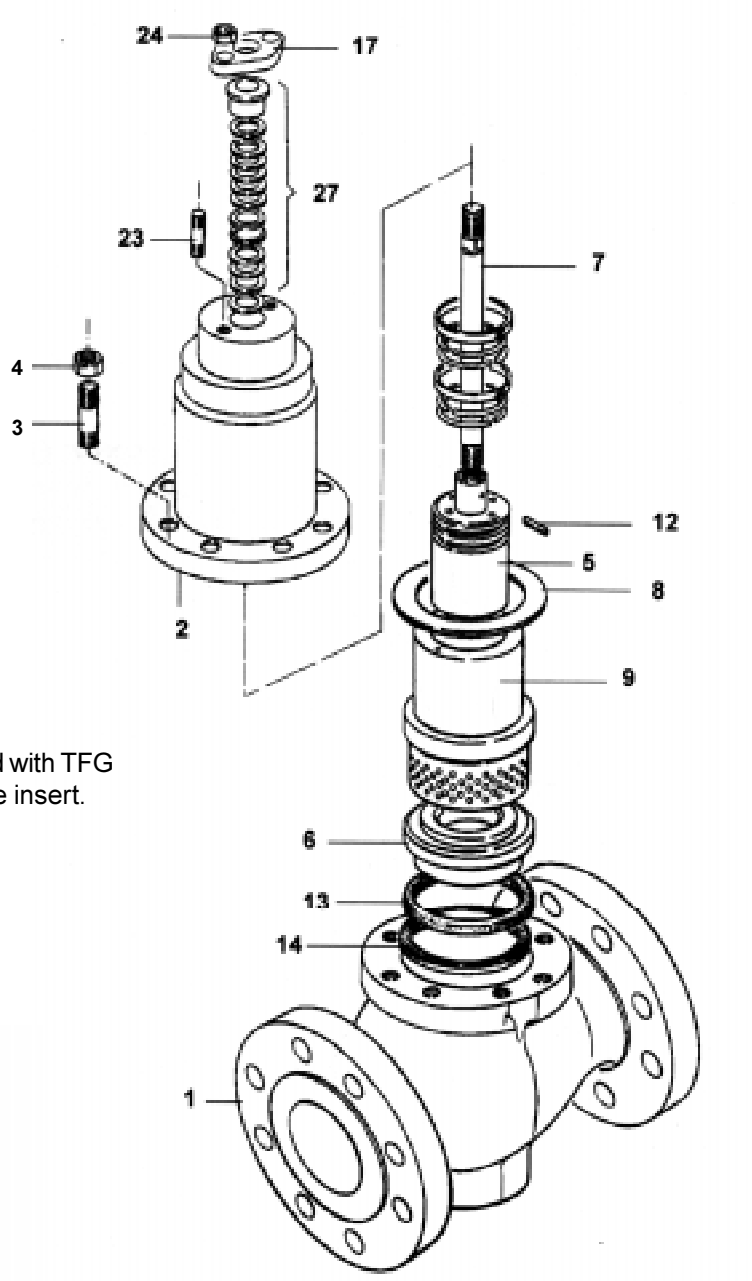
Port [in.]	Travel [mm]	Diaphragm												Cylinders							
		cat. I				cat. II				cat. III				cat. I		cat. II		cat. III		cat. IV	
		390	450	600	600L	390	450	600	600L	390	450	600	600L	300	450	300	450	300	450	300	450
2"	34	100	100			100	100			100	100										
3"	45		100	100			100	100			100	100									
4"	60			100				100				100									
5"	76			100				100				100									
6"	76				100				100				100								
7"	100				69				100				100								
8"	100				100				100				100								
9"	100				84				100				100								
10"	100				25				100				100								
12"	100																				
13"	150													100		100		100		100	
14"	150													100		100		100		100	
15"	200													100	100	100	100	100	100	100	100
16"	200													100	100	100	100	100	100	100	100

ACTUATOR CATEGORIES

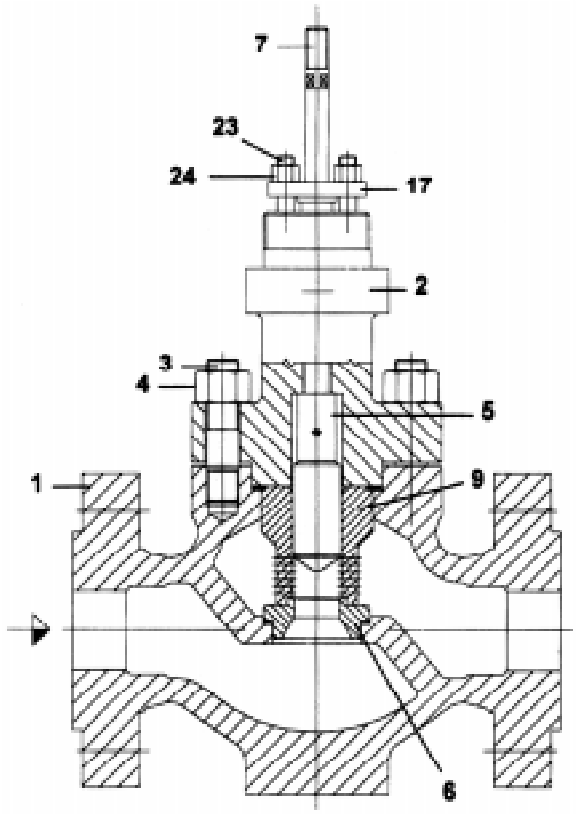
Actuator		Category I		Category II		Category III		Category IV	
Diaphragm	Air action	to-close or to-open	to-close	to-open	to-close	to-open	to-close	to-open	to-close
	Spring range - psi	3 ÷15	6 ÷30	6 ÷30	6 ÷30	15 ÷30	3 ÷15	- -	- -
	Air supply - psi	20	35	35	40	35	35	- -	- -
S.A. Cylinders.(1)	Air action	to-open	to-close	to-open	to-close	to-open	to-close	to-open	to-close
	Spring range - psi	1,5 ÷3	0,5 ÷2	2 ÷3,5	0,5 ÷2	2,5 ÷4	0,5 ÷2	3 ÷4,5	0,5 ÷2
	Air supply - psi	3,5		4		4,5		5	
Cylinders D.A.(1)	Air supply - psi	1,5		2		2,5		3	

(1) S.A. = Single acting with spring D.A. = Double acting

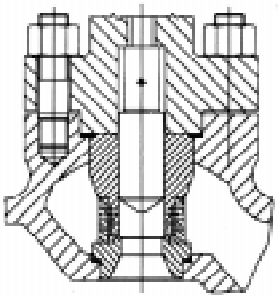
POS.	PART NAME
1	BODY
2	BONNET
3	STUD BOLT
4	NUT
5	PLUG
6	SEAT
7	STEM
8	BODY GASKET
9	CAGE
11	ADAPTER
12	PLUG PIN
13	GASKET (for special construction)
14	GASKET
15	GASKET
17	PACKING FLANGE
23	STUD BOLT
24	NUT
25	SERIAL PLATE (not shown)
26	SCREW (not shown)
27	STEM PACKING



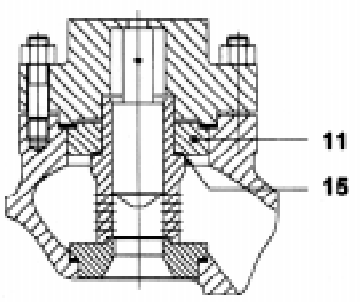
NOTE
The drawing outlines a Z91-6933 valve supplied with TFG or TFP packing and balanced plug with G type insert.



MULTICAGE TRIM



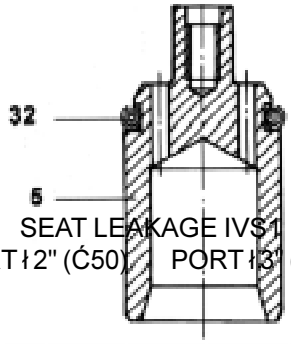
ADAPTER ASSAMBLY



BALANCED PLUGS WITH TEFLON SEAL

STANDARD DESIGN

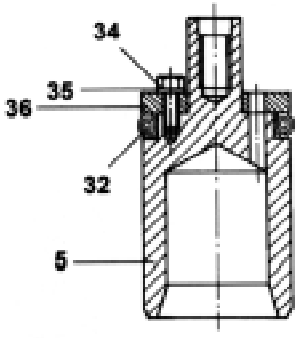
PORT
≥ 2” (∅ 50)



KAGE IV
" (Ć76)

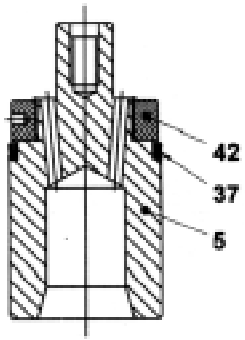
SEAT LEAKAGE IVS1
PORT ł 2" (Ć50)

PORT
≥ 4” (∅ 98)



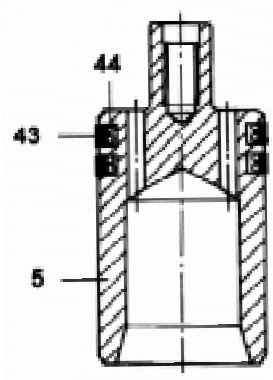
PORT ł 3" (Ć76)

SPECIAL DESIGN
FOR HIGH PRESSURE SERVICE

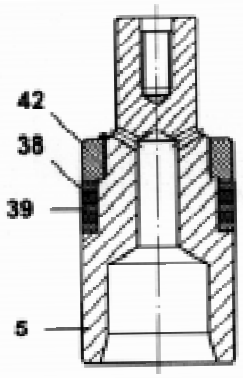


BALANCED PLUG WITH GRAPHITE SEAL

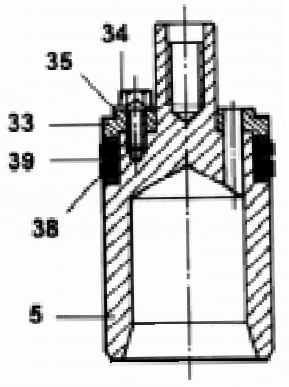
SEAT LEAKAGE IV
PORT ≥ 2” (∅ 50)



SEAT LEAKAGE IVS1
PORT ≥ 3” (∅ 76)



PORT ≥ 3” (∅ 76)



ITEM	PART NAME
5	PLUG
32	FLANGE
33	FLANGE
34	SCREW
35	LOCK WASHER

ITEM	PART NAME
36	FLANGE
37	SEAL RING
38	SEAL RING
39	SPACER
42	RING NUT
43	SEAL RING
44	SPRING

MAX ALLOWABLE TEMPERATURE OF MATERIALS	
Carbon steel type ASTM A216 VCB/A 105	-30°C +430°C
Carbon steel type ASTM A352 LCB/A 350LF1	-45°C +340°C
Chrome molybdenum steel type ASTM A217 WC6/A182 F11 (1.1/4Cr - 1 Mo)	-30°C +540°C
Chrome molybdenum steel type ASTM A217 WC9/A182 F22 (2.1/4Cr - 1 Mo)	-30°C +560°C
Chrome molybdenum steel type ASTM A217 C5/A182 F5 (5 Cr - 1 Mo)	-30°C +590°C
Stainless steel type AISI 304/316Stainless steel type AISI 316 L	-270°C +600°C
Stainless steel type AISI 304/316 nickel plated	-270°C +450°C
Stainless steel type ASTM A 182 F6NM / A352 CA6NM	-270°C +375°C
Stainless steel type ASTM A352 CA6NM nitrided	-120°C +550°C
Hardened 17-4-PH	-270°C +550°C
Hastelloy C	-270°C +450°C
Stainless steel type AISI 304/316 stellited	-200°C +550°C
Teflon insert on balanced plug	-270°C +550°C
Graphite insert on balanced plug	-100°C +200°C
Teflon ring on plug for perfect sealing	-150°C +600°C
	-100°C +200°C

MATRIAL CLASS

	Item	Part name	A	C	D	E	F	G	H
BASIC CLASS	1	BODY	A 216WCB	A 217WC6	A 217WC9	A 217 C5	A 352 LCB	AISI 316	AISI 316L
	2	BONNET	A 105	A 182 F11	A 182 F22	A 182 F5a	A350 LF2	AISI 316	AISI 316L
	3	STUD BOLT	A 193 B7 (1)					XM 19	XM 19
	4	NUT	A 194 4					AISI 304	AISI 304
	5	PLUG	SEE I' SUB-CLASS TABLE						
	6	SEAT							
	7	STEM							
	8-14-15	GASKET	AISI 321 + GRAPHITE						
	9	CAGE	SEE I' SUB-CLASS TABLE						
	11	ADAPTER		A 182 F11	A 182 F22	A 182 F5a	A350 LF2	AISI 316	AISI 316L
	12	PIN	AISI 304						(2)
	17	FLANGE	A 105 ZINC PLATED					AISI 316	
	23	STUD BOLT	AISI 304						
	24	NUT	AISI 304						
	25	SERIAL PLATE	AISI 304						
	26	SCREW	AISI 304						
	27	STEM PACKING	SEE DWG. 1-C Pr15						
	32	SEAL RING	Loaded teflon						
	33	FLANGE	SEE I' SUB-CLASS TABLE						N.A.
	34	SCREW	AISI 304					AISI 316	
	35	LOCK WASHER	AISI 304 annealed						
	37	SEAL RING + B.U.	Loaded teflon						
	38	SEAL RING	GRAPHOIL						N.A.
	39	SPACER	GRAPHITE						
	42	RING NUT	AISI 304						AISI 316L
	43	SEAL RING	GRAPHITE						N.A.
	44	SPRING	INCONEL X 750						

		CAGE Item 9	PLUG Item 5	SEAT Item 6	STEM Item 7	FLANGE Item 33
FIRST SUB - CLASS MATRIALS	01	17-4-PH H900	F6NM hardened	17-4-PH H900	AISI 316	F6NM hardened
	02		F6NM nitrided			
	03		F6NM fully stellited (3)			
	04	CA6NM nitrided	F6NM hardened	F6NM hardened		
	05		F6NM nitrided	F6NM fully stellited (3)		
	06		F6NM fully stellited (3)			
	07	AISI 304 nickel palted(4)	AISI 316	AISI 316		AISI 316
	11		AISI 316 seat stellited (3)	AISI 316 seat stellited (3)	AISI 316	
	12		F6NM fully stellited (3)			
	13			AISI 316 fully stellited (3)		
	14	AISI 316L	AISI 316L + HASTELLOY C 276 fully	AISI 316L + HASTELLOY C 276 seat	AISI 316L	/
	21	17-4-PH H1150	F6NM hardened	17-4-PH H1150	AISI 316	F6NM hardened
	22		F6NM nitrided			
	23		F6NM fully stellited (3)			

PLUG INSERT CODE	
T	LOADED TEFLON SEAL RING (item 32
L	GRAPHOIL SEAL RING (item 38)
G	GRAPHITE SEAL RING (item 43)
N	WITHOUT SEAL RING
B	LOADED TEFLON SEAL RING + BACK-UP (item 37)

(1) A 193 B16 over 430°C
(2) Stem welded to the plug
(3) Cobalt stellite grade 6
(4) AISI 304 can be replaced by AISI 316 without notice.

BASIC CLASS	SUB - CLASS	TEMPERATURE LIMITS °C (1) (2)								
		DN								
		25...50	80	100	150	200	250	300	350	400
		1"-1.1,2"-2"	3"	4"	6"	8"	10"	12"	14"	16"
A A 216 WCB	01	-30 +375					-30+360			
	02-03	-30 +430								
	04					-30 +375		-30 +300	-30 +250	-30 +200
	05-06					-30 +430				
	07-11-12-13	-30 +300	-30 +200	-30 +170	-30 +220	-30 +190	-30 +160	-30 +130	-30 +100	-30 +80
C A 217 WC6	01	-30 +375					-30 +360			
	02-03	-30 +450		-30 +430	-30 +450	-30 +430				
	04					-30 +375		-30 +300	-30 +250	-30 +200
	05-06	-30 +500	-30 +460		-30 +480	-30 +430				
D A 217 WC9	01	-30 +375								
	02-03	-30 +450		-30 +430	-30 +450	-30 +430				
	04					-30 +375		-30 +300	-30 +250	-30 +200
	05-06	-30 +500	-30 +460		-30 +480	-30 +430				
E A 217 C5	01	-30 +375				-30 +360				
	02-03	-30 +450	-30 +390	-30 +360	-30 +420					
	04						-30 +300	-30 +250	-30 +210	-30 +170
	05-06	-30 +500								
F A 352 LCB	01	-30 +340								
	02-03									
	04	-45 +340						-45 +300	-45 +250	-45 +200
	05-06									
	07-11-12-13	-45 +300	-45 +200	-45 +170	-45 +220	-45 +190	-45 +160	-45 +130	-45 +100	-45 +80
	21-22-23	-45 +340						-45 +300	-45 +250	-45 +200
G AISI 316	07-11-12-13	-150 +357	-150 +320	-150 +280	-150 +350	-150 +300	-150 +260	-150 +220	-150 +180	-150 +150
H AISI 316L	14	-150 +300			-150 +300					

- NOT APPLICABLE

		MAXIUMUM DIFERENTIAL PRESSURE FOR SUB-CLASS - bar (3) (4) (5)													
		01	02	03	04	05	06	07	11	12	13	14	21	22	23
OPENVALVE (6)	GAS	62	80		62	80		40	62		67	40	62	75	
	LIQUID	31	40		31	40		23	31		34	23	31	37	
CLOSEDVALVE (7)	GAS	100	200		100	200		40	200			40	100	180	
	LIQUID	50	100		50	100		25	100			25	50	90	

(1)Temperatures listed in the table refer to "basic class / sub class" combinations. For balanced trims supplied with seal inserts limits can be set to lower values (see diagrams)

(2)Temperatures listed in the table refer to the inlet fluid and are supposed equal to the valve ones. For stud bolts (3), nuts (4) and flange (17) a 20°C ΔT is assumed.

(3)Δp may be limited to lower values where the plug is provided with seal inserts (see diagrams).

(4)Δp max are valid for fluids which do not hold abrasive parts and for not-cavitating liquids.

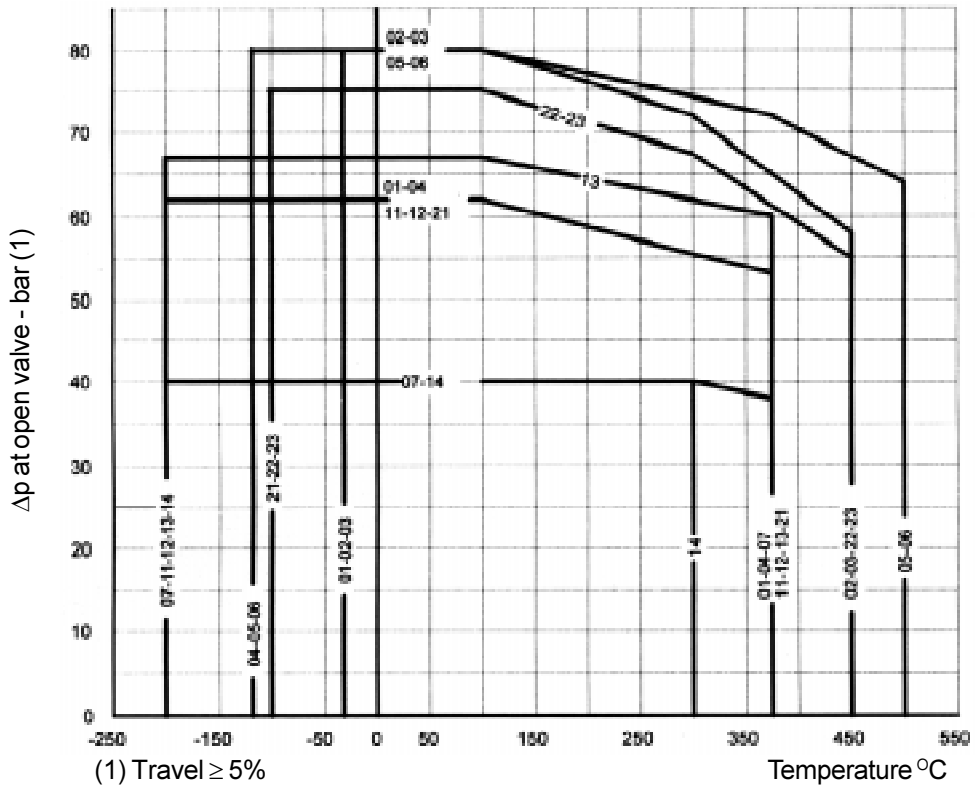
(5)Values intended for ambient temperature.

(6)Travel $\geq$ 5% - single cage.

(7)Values valid for seat leakage V and IVS1.

Max differential pressure for gas at open valve - bar
(single cage trim)

Diagarm1



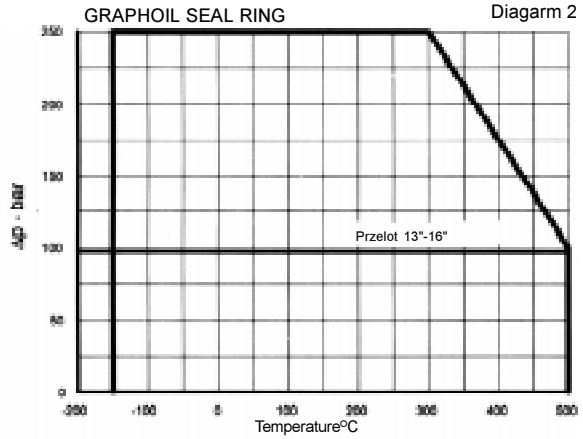
(1) Travel ≥ 5%

Temperature °C

PRESSURE / TEMPERATURE RATINGS FOR PLUG WITH SEAL INSERTS

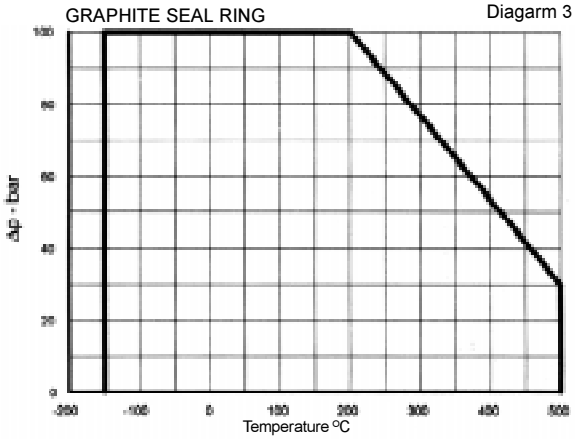
GRAPHOIL SEAL RING

Diagarm 2



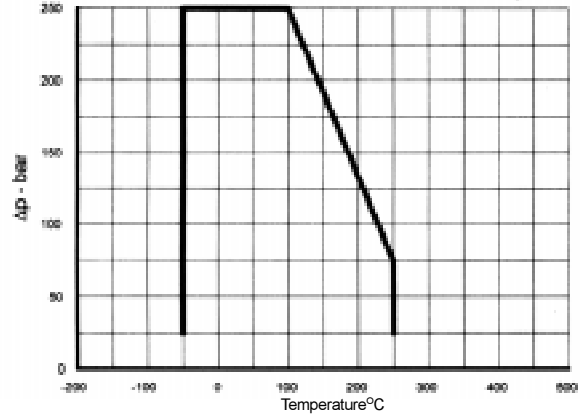
GRAPHITE SEAL RING

Diagarm 3



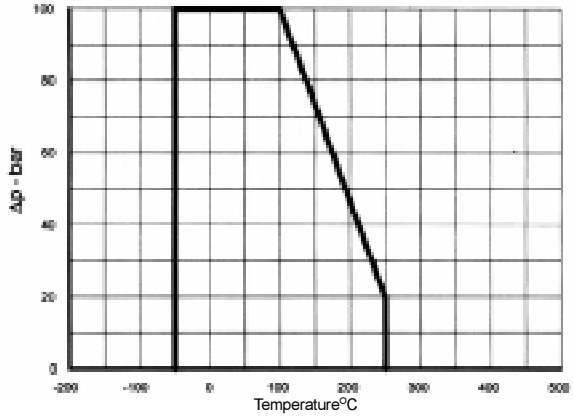
LOADED TEFLON + BACK-UP SEAL RING

Diagarm 4



LOADED TEFLON SEAL RING

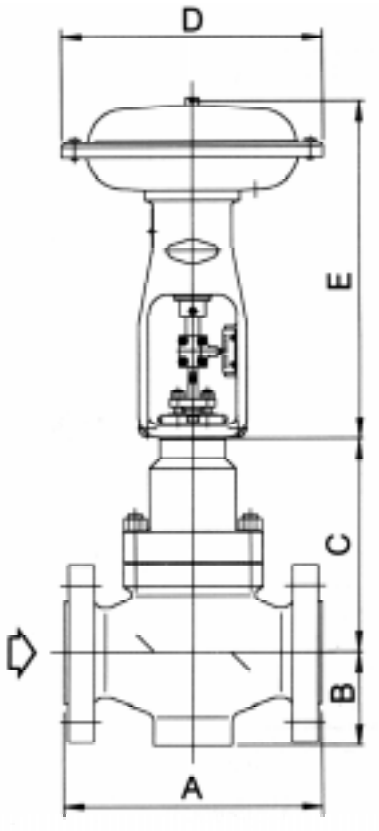
Diagarm 5



1-6933 SERIES VALVE OVERALL DIMENSION ANSI 150 ¸ 600 - mm

DN		A										B						
		FLANGED						BW ENDS		SW + SCREWED		FLANGED			BW ENDS		SW + SCREWED	
mm	in.	ANSI 150 RF	ANSI 150RJ	ANSI 300 RF	ANSI 300 RJ	ANSI 600 RF	ANSI 600 RJ	ANSI 300	ANSI 600	ANSI 300	ANSI 600	ANSI 150	ANSI 300	ANSI 600	ANSI 300	ANSI 600	ANSI 300	ANSI 600
25	1"	184	197	197	210	210	210	210	210	210	210	65	65	73	65	73	65	73
40	1 1/2"	222	235	235	248	251	251	251	251	251	251	82	82	89	89	98	89	98
50	2"	254	267	267	283	286	289	286	286	286	286	87	87	102	102	102	102	102
80	3"	298	311	317	333	337	340	336	336			119	119	121	121	121		
100	4"	352	365	368	384	394	397	394	394			135	135	137	137	137		
150	6"	451	464	473	489	508	511	473	508			167	170	185	170	185		
200	8"	543	556	568	584	610	613	568	609			193	198	220	198	220		
250	10"	673	686	708	724	752	755	708	752			225	230	260	230	260		
300	12"	737	749	775	791	819	822	775	819			270	275	307	275	307		
350	14"	889	902	927	943	972	975	927	972			314	314	/	314	/		
400	16"	1016	1029	1057	1073	1108	1111	1057	1108			378	378	/	378	/		

DN		PORT [cale]	TRAVEL mm	ACTUATORS	C		
					BONNET		
[mm]	[cale]				PLAIN	FINNED	EXTENDED
25	1"	3/4"-1/2"	17	membr. 310	168	237	265
40	1.1/2"	1.1/2"	34	membr. 390	202	296	282
				membr. 450	202	296	282
		1"	25	membr. 310	195	270	295
				membr. 390	195	255	295
		3/4"	25	membr. 310	195	270	295
50	2"	2"	34	membr. 390	273	273	353
				membr. 450	273	273	353
		1.1/2"	34	membr. 390	203	270	283
				membr. 450	203	270	283
		1"	25	membr. 310	196	271	296
				membr. 390	196	256	296
80	3"	3"	45	membr. 390	319	329	419
				membr. 450	319	379	419
		2"	34	membr. 390	294	319	394
				membr. 450	294	341	394
		1.1/2"	34	membr. 390	224	324	324
				membr. 450	224	324	324
100	4"	4"	60	membr. 450	345	360	465
				membr. 600	345	360	465
		3"	45	membr. 390	323	370	432
				membr. 450	323	370	432
		2"	34	membr. 390	298	345	398
				membr. 450	298	345	398
150	6"	6"-5"	76	membr. 600	389	439	509
		4"	60	membr. 450	345	435	456
				membr. 600	345	421	465
		3"	45	membr. 390	323	423	423
				membr. 450	323	423	423
200	8"	8"-7"	100	membr. 600L	487	538	625
		6"-5"	76	membr. 600	391	467	511
		4"	60	membr. 450	347	447	467
				membr. 600	347	467	467
250	10"	10"-9"	100	membr. 600L	509	560	647
		8"-7"	100	membr. 600L	493	544	631
		6"	76	membr. 600	412	517	532
300	12"	12"	100	membr. 600L	524	587	662
		10"-9"	100	membr. 600L	510	573	648
		8"-7"	100	membr. 600L	494	579	632
350	14"	14"-13"	150	tłok. 300	628	670	757
		12"	100	membr. 600L	569	656	656
		10"-9"	100	membr. 600L	555	642	622
400	16"	16"	200	tłok. 300	789	831	882
				tłok. 450	789	847	940
		15"	200	tłok. 300	789	831	882
				tłok. 450	789	847	940
		14"-13"	150	tłok. 300	664	758	810
		12"	100	membr. 600L	637	763	763



ACTUATOR

TYP	D	E		Masa - kg	
		Prosty	Odwrotny	Prosty	Odwrotny
membranowy 310	325	412	494	16	19
membranowy 390	400	511	662	29	39
membranowy 450	482	584	750	48	63
membranowy 600	631	745	954	98	130
membranowy 600L	631	940	1132	140	175
tłokowy 300(1)	390	700(2)	1300(2)	120	120
tłokowy 450(1)	575	900(2)	1950(2)	360	360

(1) For travel = 200 mm
(2) Without handwheel operator

1-6933 SERIES VALVE OVERALL DIMENSION ANSI 900 ÷ 1500

DN		A								B					
		FLANGED				BW ENDS		SW ENDS		FLANGED		BW ENDS		SW ENDS	
mm	cal	ANSI 900 RF	ANSI 900 RJ	ANSI 1500 RF	ANSI 1500 RJ	ANSI 900	ANSI 1500	ANSI 900	ANSI 1500	ANSI 900	ANSI 1500	ANSI 900	ANSI 1500	ANSI 900	ANSI 1500
25	1"	273	273	273	273	279	279	279	279	78	82	78	82	78	82
40	1 1/2"	311	311	311	311	311	311	311	311	95	95	95	95	95	95
50	2"	311	314	311	314	311	311	311	311	113	113	113	113	113	113
80	3"	387	390	406	409	406	406			140	140	140	140		
100	4"	464	467	483	486	483	483			150	160	150	160		
150	6"	556	559	609	609	556	609			195	205	195	205		
200	8"	708	711	765	765	708	765			240	250	240	250		
250	10"	864	864	991	991	991	991			290	300	290	300		
300	12"	968	968	1130	1130	1035	1130			320	350	320	350		

DN		PORT	TRAVEL-Mm	ACTUATORS	C		
					BONNET		
mm	cale				PLAIN	FINNED	EXTENDED
25	1"	3/4"	17	450	180	243	275
				390	180	243	275
		1/2"	17	310	180	243	275
				390	180	243	275
40	1.1/2"	1"	25	450	221	280	320
		3/4"	25	390	221	280	320
				450	221	280	320
		1/2"	17	310	221	280	320
				390	221	280	320
50	2"	1.1/2"	34	450	287	350	400
				600	287	350	400
		1"	25	450	261	320	360
		3/4"	25	390	261	320	360
				450	261	320	360
80	3"	2"	34	450	311	370	420
				600	311	370	420
		1.1/2"	34	450	308	370	420
				600	308	370	420
		1"	25	450	292	350	400
100	4"	3"	45	450	343	420	480
				600	343	420	480
		2"	34	450	327	400	460
				600	327	400	460
		1.1/2"	34	450	324	400	460
				600	324	400	460
150	6"	5"	76	600	405	480	560
		4"	60	600	395	470	550
		3"	45	600	385	460	540
				450	385	460	540
200	8"	7"	100	600L	473	560	650
		6"	76	600	440	530	620
		5"	76	600	440	530	620
		4"	60	600	420	510	600
250	10"	9"	100	600L	520	640	700
		8"	100	600L	520	640	700
		7"	100	600L	500	620	680
		6"	76	600	480	600	680
300	12"	10"	100	600L	566	710	770
		9"	100	600L	566	710	770
		8"	100	600L	550	700	750
		7"	100	600L	550	710	750

MASS ANSI 150 ÷ 600

DN		FLANGED			BW-SW ENDS	
mm	in.	ANSI 150	ANSI 150	ANSI 300	ANSI 300	ANSI 600
25	1"	24	24	24	17	17
40	1 1/2"	32	32	38	33	35
50	2"	40	40	50	35	37
80	3"	60	65	85	55	60
100	4"	90	100	130	95	110
150	6"	168	198	240	195	200
200	8"	260	315	400	236	360
250	10"	420	510	640	425	490
300	12"	610	715	925	640	680
350	14"	1320	1320	/	1165	/
400	16"	1830	1830	2200	1610	/

MASS ANSI 900 ÷ 1500

DN		FLANGED		BW-SWENDS	
mm	cale	ANSI 900	ANSI 1500	ANSI 900	ANSI 1500
25	1"	30	40	23	28
40	1 1/2"	50	65	45	60
50	2"	70	90	50	70
80	3"	140	240	100	170
100	4"	180	260	160	220
150	6"	340	470	280	380
200	8"	560	780	500	700
250	10"	800	1200	600	900
300	12"	1250	1850	920	1400

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Edition: Z91-6933/P/02/2001
valid to the next edition