

# Small Control Valve

## U.S. Type 1499 (Includes RC210)

### DESCRIPTION

The U.S. Type 1499 globe control valve is designed to fit directly into pipelines of the same flange size and rating. Its compact size and light weight make it especially suited to modulating control of medium to low flow rates within the pressure range of the flanges. Its welded construction makes it readily available in a variety of materials and in other types of flanges. Special face-to-face dimensions, as well as mixing of flange size and body size, are also available on request.

### APPLICATIONS

Type 1499 valves are widely used in industrial applications where flanged-type ends are desired to facilitate removal of the unit from the line or to comply with specific piping standards. In low flow applications, the unit occupies much less space than its larger counterparts.

### MATERIALS

<b>Body and Bonnet</b>	
Standard	316 SST, carbon steel
Optional	Monel®, Alloy 20, Hastelloy® C and B or ASTM equivalent
<b>Innervalue</b>	
Standard	316 SST
Optional	Stellite®, Monel, Alloy 20, Hastelloy C and Bor ASTM equivalent
<b>Packing</b>	
Standard	TFE CV rings, Graphite
Optional	Graphite
<b>Actuator (uses 1/2 in. size)</b>	
Standard	Die cast aluminum
Optional	316L SST on standard models

### ACTUATOR CHOICES

<b>Standard</b>	Air to open, fail close Air to close, fail open
<b>Optional</b>	With integral top-mounted positioner
<b>Standard Signals</b>	3-15#, 3-27#, 6-30#
<b>Optional Signals</b>	With positioner, 3-9#, 9-15#
<b>Accessories</b>	Filter regulator, gauges, I/P converter, limit switches, handwheel, solenoids



Shown with Type 766 Actuator

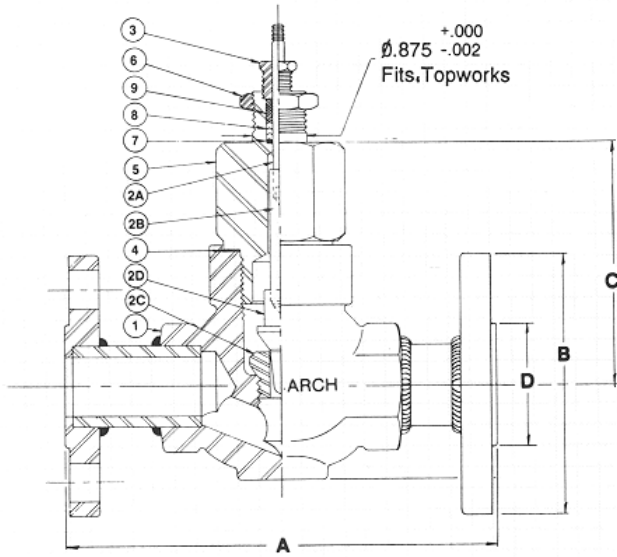
### STANDARD FEATURES

- 3/4 in. (19.1 mm) and 1 in. (25.4 mm) models
- Interchangeable trim sets
- Class 150 or Class 300 raised face flanges
- Trim characteristics: Linear, equal percent, quick open or double taper
- TFE chevron packing
- ANSI Class IV shutoff (size J trim and larger)
- Threaded bonnet for quick disassembly

### OPTIONAL FEATURES

- Special face-to-face dimensions
- Oversized flanges
- Ring type joint, tongue and groove, flat face or raised face smooth flanges
- Bellows packing solutions
- Reduced Emissions Kalrez® (REK), graphite, spring-loaded chevron and others
- Bonnet extensions for temperature extremes
- Angle pattern body
- Exotic alloys for complete valves or trims
- Stellite trims & soft seats (PTFE & Kel-F)
- TiN coating of innervalue stem and seat

**DIMENSIONS**



1. Valve body
2. Inner valve (trim) set
  - a. Stem: 3/16 in. (4.7 mm) diameter
  - b. Intermediate/guide stem: 3/18 in. (4.2 mm) diameter
  - c. Seat: 3/4 in. (19.1 mm) hex, 1-5/16 in. (33.3 mm) hex
3. Packing gland: 1/2 in. (12.7 mm) hex (Some exotic material bonnets are round with wrench flats.)
4. Body-bonnet gasket (not supplied on exotic materials)
5. Bonnet: 3/4 in. (19.1 mm) valve: 1-1/2 in. (38.1 mm) hex.  
1 in. (25.4 mm) valve: 1-3/4 in. (44.5 mm) hex.
6. Yoke lock nut: 1-1/8 in. (28.6 mm) hex
7. Packing adapter
8. Packing
9. Packing follower

PS	Class	A	B	C	D	Stroke
0.75 in. (19.1 mm)	150#	7.25 in. (184 mm)	3.88 in. (98 mm)	3.90 in. (99 mm)	1.63 in. (41 mm)	0.562 in. (14 mm)
	300#	7.625 in. (194 mm)	4.63 in. (118 mm)			
1 in. (25.4 mm)	150#	7.25 in. (184 mm)	4.25 in. (108 mm)	3.95 in. (100 mm)	2.00 in. (51 mm)	
	300#	7.25 in. (184 mm)	4.88 in. (124 mm)			

**PRESSURE VS TEMPERATURE RATING**

3/4 in. (19.1 mm) Valve				
Temp ° F (° C)	316 SS		Carbon Steel	
	Class 150 psig (barg)	Class 300 psig (barg)	Class 150 psig (barg)	Class 300 psig (barg)
100 (38)	275 (19)	720 (50)	285 (20)	740 (51)
200 (93)	240 (16.6)	620 (43)	260 (18)	675 (47)
300 (149)	215 (15)	560 (39)	230 (16)	655 (45)
400 (204)	195 (13)	515 (36)	200 (14)	635 (44)
500 (260)	170 (12)	480 (33)	170 (12)	600 (41)
600 (316)	140 (97)	450 (31)	140 (97)	550 (38)
700 (371)	110 (8)	430 (30)	110 (8)	535 (37)
800 (427)	80 (5)	415 (29)	—	—

**Rec. Bonnet Torque = 290 ft-lb (393 Nm)**

1 in. (25.4 mm) Valve				
Temp ° F (° C)	316 SS		Carbon Steel	
	Class 150 psig (barg)	Class 300 psig (barg)	Class 150 psig (barg)	Class 300 psig (barg)
100 (38)	275 (19)	720 (50)	285 (20)	740 (51)
200 (93)	240 (16.6)	620 (43)	260 (18)	675 (47)
300 (149)	215 (15)	560 (39)	230 (16)	655 (45)
400 (204)	195 (13)	515 (36)	200 (14)	635 (44)
500 (260)	170 (12)	480 (33)	170 (12)	600 (41)
600 (316)	140 (97)	450 (31)	140 (97)	550 (38)
700 (371)	110 (8)	255 (17.6)	110 (8)	535 (37)
800 (427)	—	—	—	—

**Rec. Bonnet Torque = 345 ft-lb (468 Nm)**

**NOTE:** TFE chevron ring packing temperature limit is 400° F (204° C). Consult the factory for higher temperatures. The charts are a combination of ANSI B16.34 and Badger Meter ratings for the valve superstructure.

**INNERVALVE CHART**

Valve Size	Trim Size	Nominal Cv	Theoretical Turbulent Cv	Orifice Dia. in. (mm)	Orifice Area in. <sup>2</sup> (mm <sup>2</sup> )	Nominal Rangeability	
						Linear	Equal %
1 in. (25.4 mm)	6.0	6.0	6.0	0.625 (15.9)	0.307 (197.9)	50:1	60:1
	5.0	5.0	5.0	0.625 (15.9)	0.307 (197.9)	50:1	60:1
	4.5	4.5	4.5	0.500 (12.7)	0.197 (127.0)	50:1	60:1
3/4 in. (19.1 mm) and 1 in. (25.4 mm)	4.0	4.0	4.0	0.500 (12.7)	0.197 (127.0)	50:1	60:1
	3.5	3.5	3.5	0.500 (12.7)	0.197 (127.0)	50:1	60:1
	A	2.5	2.5	0.3750 (9.5)	0.1105 (71.3)	40:1	50:1
	B	2.0	2.0	0.3750 (9.5)	0.1105 (71.3)	40:1	50:1
	C	1.25	1.25	0.2810 (7.1)	0.0621 (40.0)	40:1	50:1
	D	0.80	0.8	0.2500 (6.4)	0.0491 (31.7)	40:1	50:1
	E	0.50	0.5	0.2500 (6.4)	0.0491 (31.7)	40:1	50:1
	F	0.32	0.32	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	G	0.20	0.2	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	H	0.13	0.13	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	I	0.08	0.08	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	J	0.05	0.05	0.1560 (3.9)	0.0191 (12.3)	30:1	40:1
	K	0.03	4.8E-02	0.0860 (2.2)	0.0058 (3.7)	25:1	—
	L	0.02	3.4E-02	0.0860 (2.2)	0.0058 (3.7)	25:1	—
	M	0.01	1.6E-02	0.0860 (2.2)	0.0058 (3.7)	25:1	—
N	0.006	1.0E-02	0.0860 (2.2)	0.0058 (3.7)	25:1	—	
O	0.003	5.3E-03	0.0860 (2.2)	0.0058 (3.7)	25:1	—	

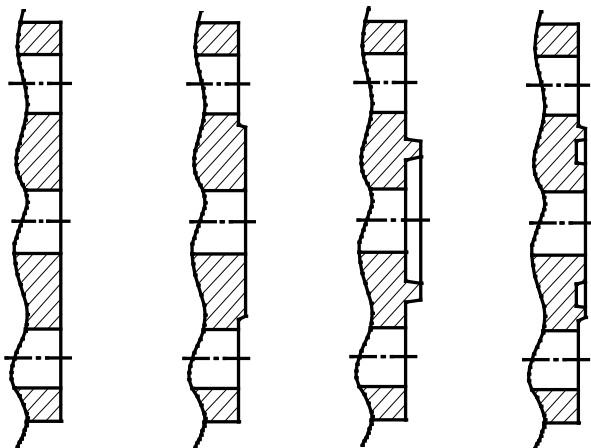
**NOTE:** K...O trims and the P-series trims are considered reduced trims.

# Information Specific to RC210 Flanged Control Valves with DIN

## DESCRIPTION

- Control valve in sizes 1 in., 3/4 in. and 1/2 in.
- Globe cast body with welded on flanges or cast housing
- Suitable for control of medium and low flow
- Many variations not listed here

## FLANGES



EN 1092-1			
Form A	Form B1, B2	Form C	Form D
DIN 2526	DIN 2526	DIN 2526	DIN 2522
Form A-B	Form C-E	Form F	Form N

EN 1092-1	DIN 2526	ANSI B16-5	
Form A	RA 12.5 mm	Form B	
RFSF (Raised Face Smooth Finish)	—	RF (Raised Face) RFSF (Raised Face Smooth Finish)	
Not applicable	Form C	FF (Flat Face) FFSF (Flat Face Smooth Finish)	
FFSF (Flat Face Smooth Finish)	—		
Form B1	RA 3.2 mm to PN40	Form D	
Form B2	RA 0.8 mm to PN63	Form E	
Form C	Tongue	Form F	
Form D	Groove	Form N	
			T G, RTJ

## ACTUATOR CHOICES

### Pneumatic Actuator

<b>Standard Type</b>	Air to open, fail close Air to close, fail open
<b>Optional Type</b>	With integral top-mounted positioner
<b>Standard Material</b>	Die cast Aluminium with Epoxy paint
<b>Optional Material</b>	316L S/S (For 1/2 in. valves only)

### Electric Actuator

<b>Optional Special Types Available</b>	Explosion-proof: Air to open, fail close Air to close, fail open
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## PRESSURE VS TEMPERATURE RATING ACC. DIN

Max. pressure in bar.

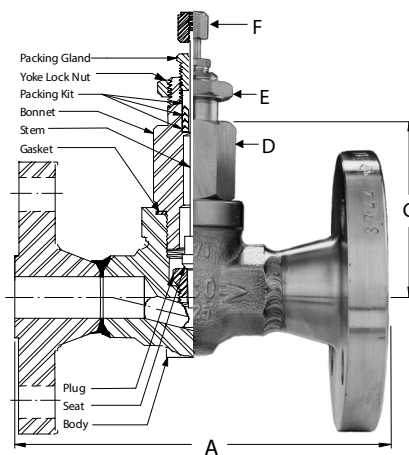
°C	PN16	PN40	PN100	PN160	PN320
20	16	40	100	160	320
100	14	34	85	136	271
200	11	29	72	115	2229
300	10	25	64	102	203
400	9	24	60	195	191
500	8	22	54	87	174

## PRESSURE VS TEMPERATURE RATING ACC. ANSI

Max. pressure in bar.

°C	150#	300#	600#	900#	2500#
20	19	50	99	149	340
100	16	42	84	127	320
200	14	36	71	107	269
300	10	32	63	95	242
400	7	29	59	89	226
500	3	27	54	82	190

## DIMENSIONS



Dim.	C	D	E	F
RC 1 in.	100	1-3/4 in.	1-1/8 in.	1/2 in.
RC 3/4 in.	99	1-1/2 in.	1-1/8 in.	1/2 in.
RC 1/2 in.	72	1-1/4 in.	1-1/8 in.	1/2 in.

Dim. A	DN15	DN20	DN25	DN32	DN40	DIN 3202
PN 16/40	130	150	160	180	200	
PN 100/160	210	230	230	260	260	
PN 320	230	260	260	300	300	

	1/2 in.	3/4 in.	1 in.	1-1/2 in.	2 in.	ANSI B16.10-1973
150#	108	184	184	222	254	
300#	152	194	197	235	267	
600#	165	206	210	251	286	
900#/1500#	216	229	254	305	368	
2500#	264	273	308	384	451	

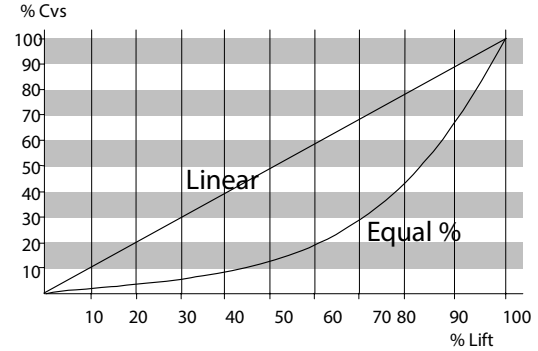
## INNERVALVE CHART

Valve Size	Trim Size	Nominal Cvs	Theoretical Turbulent Cv
1 in.	V	6.0	6.0
	U	5.0	5.0
	T	4.5	4.5
3/4 in. and 1 in.	S	3.0	4.0
	R	3.5	3.5
1/2 in. and 3/4 in.	A	2.5	2.5/2.2
	B	2.0	2.0
	C	1.25	1.25
	D	0.80	0.80
	E	0.50	0.50
	F	0.32	0.32
	G	0.20	0.20
	H	0.13	0.13
	I	0.08	0.08
	J	0.05	0.05
	K	0.03	4.8E-02
	L	0.02	3.4E-02
	M	0.01	1.6E-02
	N	0.006	1.0E-02
	O	0.003	5.3E-03
1/2 in.	P1	2.0 E-03	3.6E-03
	P2	1.3 E-03	2.5E-03
	P3	1.0 E-03	2.0E-03
	P4	6.0 E-04	1.4E-03
	P5	4.0 E-04	1.0E-03
	P6	2.7 E-04	8.3E-04
	P7	1.8 E-04	6.8E-04
	P8	1.2 E-04	5.6E-04
	P9	8.0 E-05	4.6E-04

## Seat Leakage

0.01% of Cvs for "O" and larger ANSI Class IV  
 0.1% of Cvs for "P1" and smaller ANSI Class III  
 Optional: Metallic or soft seated (PTFE or Kel-F).

## Innervalue Characteristics



## Control. Manage. Optimize.

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### DESCRIPTION

The Type NRMA Non-Rotating Manual Actuation design is used in applications where either our low-flow trims, cooling fins or bellows are needed and when applications demand human interaction. The manual actuator can be mounted on all RC series valves, including all "P" Trims and all Bonnets. Exchanging between electrical, pneumatic and manual actuators is therefore possible at any time with simple additions. The actuator is encapsulated and completely maintenance-free—designed for fine control.

### APPLICATIONS

When you turn the hand wheel, the valve interior moves in a linear motion. This linear movement, from the hand wheel to the internal coupling, prevents damage to the trim and seat, distinguishing this design from conventional manual control valves.

### FEATURES

- Hand drive, linear
- Suitable for Badger Meter® modular construction

### MATERIALS

<b>Case</b>	1.4404 (316L)
<b>Yoke</b>	1.4404 (316L)
<b>Hand Wheel</b>	Duroplast

### SPECIFICATIONS

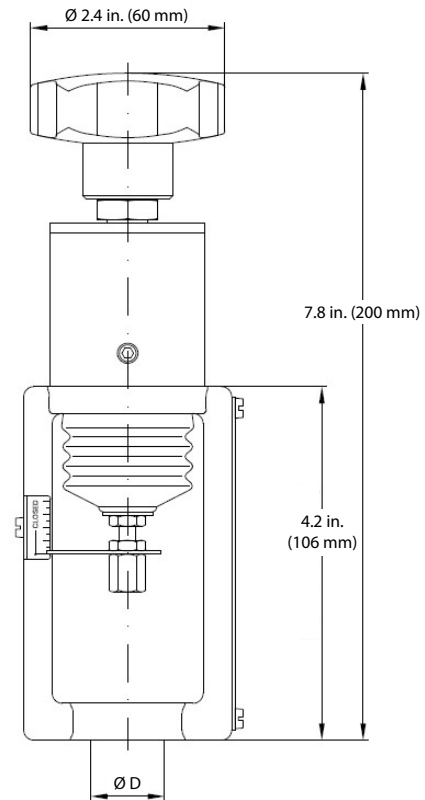
<b>Weight</b>	Approximately 3.3 lb (1.5 kg)
<b>Temperature</b>	-40...176° F (-40...80° C)
<b>Valve Lift</b>	0.04 in. (1 mm) / 360° turn

### SIZES FOR RESEARCH CONTROL VALVES

Sizes	Ø Average	Stroke
1/4 in. standard	0.625 in.	11.1 mm
1/2 in., 3/4 in., 1 in. standard	0.875 in.	14.3 mm
1/2 in., 3/4 in., 1 in. heavy duty guiding	0.875 in.	14.3 mm



### DIMENSIONS



RCV Valves		Trim Sizes Equal %															
% Lift	% Cv	6.0	5	4.5	4	3.5	A	B	C	D	E	F	G	H	I	J	% Lift
0%	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
5%	1.0%	0.06	0.05	0.04	0.04	0.03	0.02	0.02	0.01	0.008	0.005	0.003	0.002	0.001	0.001	0.000	5%
10%	1.9%	0.11	0.10	0.09	0.08	0.07	0.05	0.04	0.02	0.015	0.010	0.006	0.004	0.002	0.002	0.001	10%
20%	3.8%	0.23	0.19	0.17	0.15	0.13	0.10	0.08	0.05	0.031	0.019	0.012	0.008	0.005	0.003	0.002	20%
25%	4.8%	0.29	0.24	0.22	0.19	0.17	0.12	0.10	0.06	0.038	0.024	0.015	0.010	0.006	0.004	0.002	25%
30%	5.9%	0.35	0.29	0.26	0.23	0.20	0.15	0.12	0.07	0.047	0.029	0.019	0.012	0.008	0.005	0.003	30%
40%	8.8%	0.53	0.44	0.40	0.35	0.31	0.22	0.18	0.11	0.070	0.044	0.028	0.018	0.011	0.007	0.004	40%
50%	13.2%	0.79	0.66	0.59	0.53	0.46	0.33	0.26	0.16	0.105	0.066	0.042	0.026	0.017	0.011	0.007	50%
60%	19.8%	1.19	0.99	0.89	0.79	0.69	0.49	0.40	0.25	0.158	0.099	0.063	0.040	0.026	0.016	0.010	60%
70%	29.6%	1.78	1.48	1.33	1.19	1.04	0.74	0.59	0.37	0.237	0.148	0.095	0.059	0.039	0.024	0.015	70%
75%	36.3%	2.18	1.81	1.63	1.45	1.27	0.91	0.73	0.45	0.290	0.181	0.116	0.073	0.047	0.029	0.018	75%
80%	44.4%	2.67	2.22	2.00	1.78	1.56	1.11	0.89	0.56	0.356	0.222	0.142	0.089	0.058	0.036	0.022	80%
90%	66.7%	4.00	3.33	3.00	2.67	2.33	1.67	1.33	0.83	0.533	0.333	0.213	0.133	0.087	0.053	0.033	90%
100%	100%	6.00	5.00	4.50	4.00	3.50	2.50	2.00	1.25	0.800	0.500	0.320	0.200	0.130	0.080	0.050	100%
Valve Sizes		1"	1"	1"	1", 3/4"	1", 3/4"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	

Trim Sizes O through P-18 are available only in linear characteristic. See Product Data Sheets for maximum Cvs.

RCV Valves		Trim Sizes Equal %															
% Lift	% Cv	6.0	5	4.5	4	3.5	A	B	C	D	E	F	G	H	I	J	% Lift
0%	0%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
5%	1.0%	0.30	0.25	0.23	0.20	0.18	0.13	0.10	0.06	0.040	0.025	0.016	0.010	0.007	0.004	0.003	5%
10%	1.9%	0.60	0.50	0.45	0.40	0.35	0.25	0.20	0.13	0.080	0.050	0.032	0.020	0.013	0.008	0.005	10%
20%	3.8%	1.20	1.00	0.90	0.80	0.70	0.50	0.40	0.25	0.160	0.100	0.064	0.040	0.026	0.016	0.010	20%
25%	4.8%	1.50	1.25	1.13	1.00	0.88	0.63	0.50	0.31	0.200	0.125	0.080	0.050	0.033	0.020	0.013	25%
30%	5.9%	1.80	1.50	1.35	1.20	1.05	0.75	0.60	0.38	0.240	0.150	0.096	0.060	0.039	0.024	0.015	30%
40%	8.8%	2.40	2.00	1.80	1.60	1.40	1.00	0.80	0.50	0.320	0.200	0.128	0.080	0.052	0.032	0.020	40%
50%	13.2%	3.00	2.50	2.25	2.00	1.75	1.25	1.00	0.63	0.400	0.250	0.160	0.100	0.065	0.040	0.025	50%
60%	19.8%	3.60	3.00	2.70	2.40	2.10	1.50	1.20	0.75	0.480	0.300	0.192	0.120	0.078	0.048	0.030	60%
70%	29.6%	4.20	3.50	3.15	2.80	2.45	1.75	1.40	0.88	0.560	0.350	0.224	0.140	0.091	0.056	0.035	70%
75%	36.3%	4.50	3.75	3.38	3.00	2.63	1.88	1.50	0.94	0.600	0.375	0.240	0.150	0.098	0.060	0.038	75%
80%	44.4%	4.80	4.00	3.60	3.20	2.80	2.00	1.60	1.00	0.640	0.400	0.256	0.160	0.104	0.064	0.040	80%
90%	66.7%	5.40	4.50	4.05	3.60	3.15	2.25	1.80	1.13	0.720	0.450	0.288	0.180	0.117	0.072	0.045	90%
100%	100%	6.00	5.00	4.50	4.00	3.50	2.50	2.00	1.25	0.800	0.500	0.320	0.200	0.130	0.080	0.050	100%
Valve Sizes		1"	1"	1"	1", 3/4"	1", 3/4"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/2"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	1-1/4"	

Numbers are for reference or comparison only.

% Lift	% Maximum Cv	
	Linear	Equal %
0%	0%	0%
5%	5%	1%
10%	10%	2%
20%	20%	4%
25%	25%	5%
30%	30%	6%
40%	40%	9%
50%	50%	13%
60%	60%	20%
70%	70%	30%
75%	75%	36%
80%	80%	44%
90%	90%	67%
100%	100%	100%

**% Cv vs. % Lift**

