TECHNICAL BULLETIN

Tour & Andersson Balancing Valves

TBV-S Series 785, STAS Series 786 and STAD Series 787

GENERAL INFORMATION

STAD Series 787 & STAS Series 786

Drain Option: Valves are supplied without a drain fitting. A drain fitting with ¾" hose connection can be installed while valve is in operation as described on page 7.

Measurement Points: Measuring points are self-sealing. To use, remove the cap and then insert the probe through the seal.

Insulation: Prefab insulation is available as an option as described on page 7.

TECHNICAL DESCRIPTION

STAD Series 787 & STAS Series 786

Application: Heating and cooling installations (glycol/brine). Potable water installations (hot/cold). Seawater (cold).

Functions:

STAD: NPT threads, balancing, shut-off, draining (optional), pre-setting of flow, flow measuring, pressure reading.

STAS: Solder ends, balancing, shut-off, draining (optional), pre-setting of flow, flow measuring, pressure reading.

Max. Working Pressure: 300 psi (2065 kPa).

Max. Working Temperature: 230°F (110°C).

Min. Working Temperature: –4°F (–20°C).

Material: The valves are made of AMETAL† and are fitted with a red handwheel made of Polyamid plastic and a protection cap.

Seat Sealing: EPDM o-ring.

Stem Seals: EPDM o-rings.

Threads: Internal ½ NPT - 2 NPT (STAD).

Solder Ends: Internal ½ - 2 (STAS).

TBV-S Series 785*

Application: Heating and cooling installations.

Functions: Balancing, shut-off, measuring pressure drop and flow.

Max. Working Pressure: 125 psi (862 kPa).

Max. Working Temperature: 250°F (120°C).

Sizes: ½ - ¾" solder style.

Material: The valves are made of AMETAL†.

Handwheel: Red handwheel made of polyamid plastic.

Seat Sealing: Metallic.

Stem Sealing: EPDM o-ring.

Measurement Points: Measuring points are self-sealing. To use, remove the cap and then insert the probe through the seal.

*Valves are shipped with probe ports and handwheel disassembled.

† Registered Trademark of TA Hydronics.

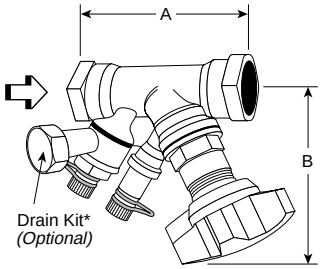
VICTAULIC® WORLD HEADQUARTERS • P.O. Box 31 • Easton, PA, USA 18044-0031 • 1-800-PICK VIC • FAX: 610/250-8817 • www.victaulic.com
VICTAULIC COMPANY OF CANADA • 65 Worcester Road • Rexdale, Ontario, Canada M9W 5N7 • Phone: 416/675-5575 • FAX: 416/675-5729 • www.victaulic.com

TB-5-5-10 1826 Rev. B 2/02

TYPICAL CONFIGURATIONS

STAD Series 787

For balancing, shut-off, draining, pre-setting of flow, flow measuring and pressure reading. NPT threads.



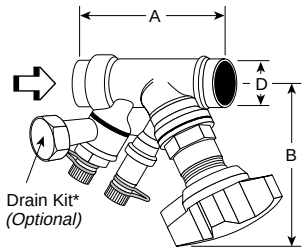
➪ = Flow Direction

SERIES 787			
Nominal Pipe Size Inches/mm	Dimensions – Inches/millimeters		Aprx. Weight Each Lbs./kg
	A	B	
½ 15	3.50 89	4.00 102	1.5 0.7
¾ 20	3.81 97	4.00 102	1.6 0.7
1 25	4.31 109	4.50 114	2.0 0.9
1¼ 32	4.88 124	4.31 109	2.6 1.2
1½ 40	5.12 130	4.75 121	3.3 1.5
2 50	6.12 155	4.75 121	5.0 2.3

*The drain option is available for sizes ½ - 2" STAD/STAS.

STAS Series 786

For balancing, shut-off, draining, pre-setting of flow, flow measuring and pressure reading. Solder ends.



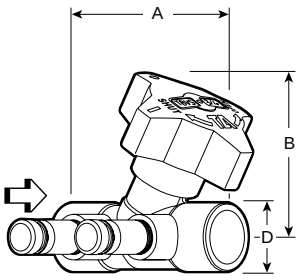
➪ = Flow Direction

SERIES 786				
Nominal Pipe Size Inches/mm	Dimensions – Inches/millimeters			Aprx. Weight Each Lbs./kg
	A	B	D	
½ 15	3.50 89	4.00 102	0.50 13	1.4 0.6
¾ 20	3.81 97	4.00 102	0.75 19	1.4 0.6
1 25	4.31 109	4.50 114	1.00 25	1.9 0.9
1¼ 32	4.88 124	4.31 109	1.25 32	2.4 1.1
1½ 40	5.12 130	4.75 121	1.50 38	3.1 1.4
2 50	6.12 155	4.75 121	2.00 51	4.5 2.0

*The drain option is available for sizes ½ - 2" STAD/STAS.

TBV-S Series 785

For balancing, shut-off, draining, flow measuring and pressure reading. Solder ends.



➪ = Flow Direction

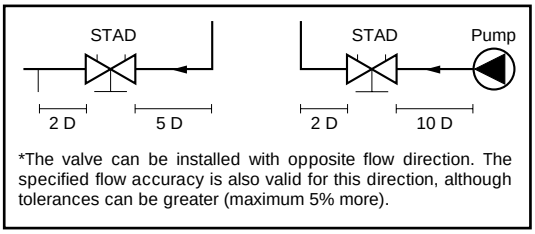
SERIES 785*				
Nominal Pipe Size Inches/mm	Dimensions – Inches/millimeters			Aprx. Weight Each Lbs./kg
	A	B	D	
½ 15	2.63 67	2.88 73	0.50 13	1.0 0.5
¾ 20	3.16 80	3.16 80	0.75 19	1.0 0.5

*Drain option not available on Series 785.

Measuring Accuracy

The handwheel zero position is calibrated and must not be changed.

Valves have an accuracy of flow measurement of 3% to 5% when used within their recommended flow range and installed in accordance with the figure to the right.



*The valve can be installed with opposite flow direction. The specified flow accuracy is also valid for this direction, although tolerances can be greater (maximum 5% more).

Correction Factors

For liquids other than water, the flow values from the CBI (or determined using the balancing wheel) can be adjusted as follows:

Divide the flow rate (as indicated by CBI or balancing wheel) by the square root of the volume by weight (specific density γ).

$$Actual\ Flow = \frac{q_{CBI}}{\sqrt{\gamma}}$$

This applies to liquids having, on the whole, the same viscosity as water, i.e. most water/glycol mixtures and water/brine solutions at room temperature. At low temperatures, the viscosity increases and laminar flow may occur in certain valves. The risk increases with small valves, low settings and low differential pressures.

A computer program (TA-Select) is available for calculation of pre-setting values and other applications. When the flow setting is verified or changed to the final setting, the memory stop should be set. Contact Victaulic for further information.

Sizing a Balancing Valve

When Δp and the design flow are known, use the formula shown to calculate the C_V value or use the graph on page 5. The T&A balancing wheel can also be used.

$$C_V = 1.52 \frac{q}{\sqrt{\Delta p}}$$

q in GPM, Δp in Ft. of H_2O

$$C_V = \frac{q}{\sqrt{\Delta p}}$$

q in GPM, Δp in PSI

A computer program, TA-Select, is available from Victaulic for calculation of pre-setting values and other applications.

C_V Values for Various Handle Settings

STAD Series 787 & STAS Series 786

The values at right or the graph on page 6 may be used when calculating and sizing a piping system.

No. of Turns	C_V Values for Sizes listed below §					
	½"	¾"	1"	1¼"	1½"	2"
0.50	0.15	0.59	0.70	1.32	2.03	2.97
1.00	0.25	0.88	1.19	2.20	3.83	4.87
1.50	0.36	1.38	2.44	3.60	5.34	8.35
2.00	0.66	2.20	4.20	5.40	7.08	13.60
2.50	1.02	3.24	6.15	8.24	10.20	18.80
3.00	1.60	4.49	8.00	11.00	14.60	24.90
3.50	2.30	5.51	9.28	13.70	18.60	30.70
4.00*	2.92	6.61	10.09	16.50	22.30	38.00

§ C_V = GPM at a ΔP of 1 PSI (7 kPa) through the valve at any given setting.
1 PSI = 2.31 ft. of H2O.
*Full open valve.

C_V Values for Various Handle Settings

TBV-S Series 785

The values at right or the graph on page 6 may be used when calculating and sizing a piping system.

Size Inches	C_V Values for Number of Turns listed below §						
	0.25	0.30	0.35	0.40	0.50	0.75	1.00*
½	0.41	0.72	1.03	1.34	1.97	3.02	3.25
¾	0.58	0.95	1.32	1.70	2.44	4.18	4.52

§ C_V = GPM at a ΔP of 1 PSI (7 kPa) through the valve at any given setting.
1 PSI = 2.31 ft. of H2O.
*Full open valve.

Balancing Wheel

By using the balancing wheel, it is easy to determine the relationship between flow, pressure and the handwheel setting values for all valve sizes. Order the balancing wheel from your nearest Victaulic representative.

Measuring Instruments

Style 737

Style 738

Use the Style 737 Computer Balancing Instrument (CBI). This is programmed with valve characteristics for TA balancing valves, enabling measured differential pressure to be read off directly as a flow rate.

Style 738 portable differential pressure meter is an accurate device for measuring differential pressure in TA Hydronics circuit balancing valves. Using the balancing wheel supplied with the meter, the measured pressure differential can be converted to a flow measurement. Style 738 can be used on systems up to the full rated working pressure of TA Hydronics valves (or up to 500 psi/3447 kPa on other devices).

Valve Selection Guide

Balancing valves should be sized in relation to the GPM flows (and not in relation to pipeline size).

• The Min. flow is calculated from the minimum setting of the valve and the minimum recommended pressre drop, 1 Ft WG (= 3 kPa).

• The Nom. Flow is calculated from the maximum setting of the valve and the minimum recommended pressure drop, 2 Ft WG (= 6 kPa).

• The Max. flow is calculated from the maximum setting of the valve and the maximum recommended pressure drop, 20 Ft WG (= 60 kPa).

When Δp and the design flow are known, use formula shown to calculate the Cv-value.

$$C_V = 1.52 \frac{q}{\sqrt{\Delta p}}$$

q in GPM, Δp in Ft.

$$C_V = \frac{q}{\sqrt{\Delta p}}$$

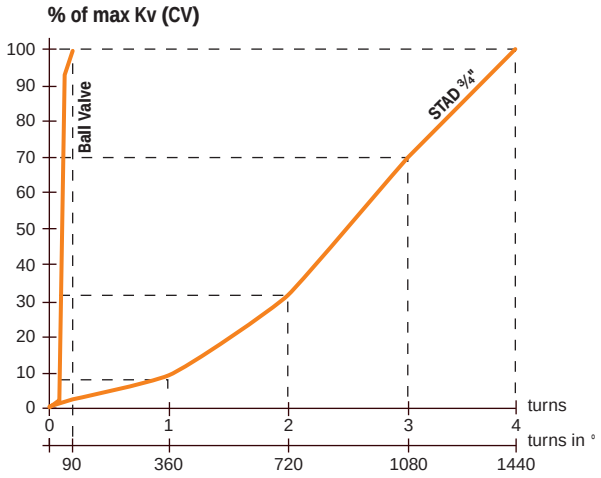
q in GPM, Δp in PSI

A computer program, TA-Select, is available from TA Hydronics for calculation of pre-setting values and other applications.

Size (In.)	Min. Flow (GPM)	Nom. Flow (GPM)	Max. Flow (GPM)
Series 785 TBV-S			
½	0.27	3.0	9.5
¾	0.38	4.2	15.0
Series 786/787/787-U STAS/STAD			
½	0.13	2.7	8.6
¾	0.39	6.2	20.0
1	0.45	9.4	30.0
1¼	0.87	15.0	48.0
1½	1.30	21.0	66.0
2	2.00	36.0	110.0
Series 788/789 STAF-SG/STAG			
2½	1.40	92.0	290.0
3	1.50	130.0	410.0
4	1.90	200.0	650.0
5	4.20	320.0	1020.0
6	5.00	450.0	1430.0
8	30.00	820.0	2600.0
10	70.00	1280.0	4040.0
12	115.00	1550.0	4950.0

Comparison of Throttling Characteristics

Comparison between the adjustments of a ball valve and a TA Hydronics balancing Valve.



Diagram

This graph shows the pressure drop across the pressure test points of the valve.

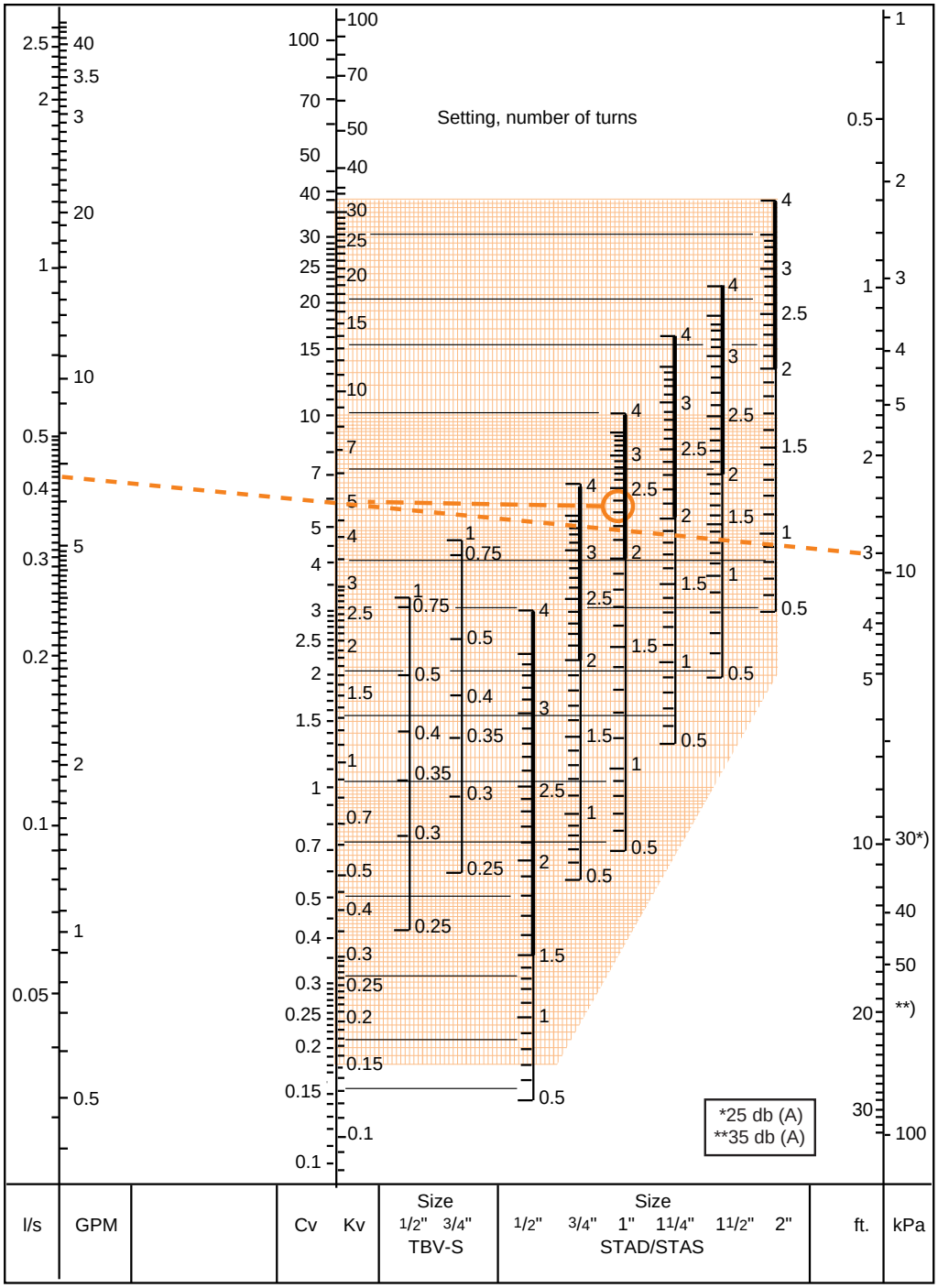
A straight line connecting the bars for flow rate, C_V and pressure drop shows the relationship between these variables. The position for each valve size is arrived at by drawing a horizontal line from the C_V value obtained.

Example:

Wanted: Pre-setting for a 1" valve at a desired flow rate of 6.7 GPM and a pressure drop of 3 ft.

Solution: Draw straight line joining 6.7 GPM and 3 ft. This gives C_V = 5.9. Now draw a horizontal line from C_V = 5.9. This intersects the bar for a 1" valve at the desired pre-setting of 2.35 turns.

NOTE: If the flow rate falls outside of the scale in the diagram, the reading can be made as follows: Starting with the example at left, we get 3 ft., C_V = 5.9 and the flow rate 6.7 GPM. At 3 ft. and C_V = .59 we get the flow rate .67 GPM. That is, for a given pressure drop, it is possible to read 10 times or 0.1 times the flow and C_V values.

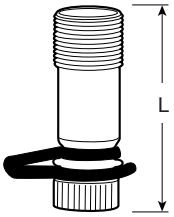


ACCESSORIES

Probe Port

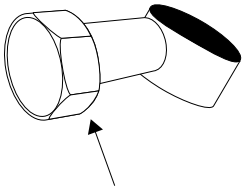
TBV-S Series 785,
STAD Series 787 &
STAS Series 786
(1 piece)

Size Inches/mm	Victaulic Part Code	L Inches/mm
SERIES 785		
½ - ¾ 15 - 20	K-000-785-012	1.19 30
SERIES 786/787		
½ - 2 15 - 50	K-000-740-003	1.75 45



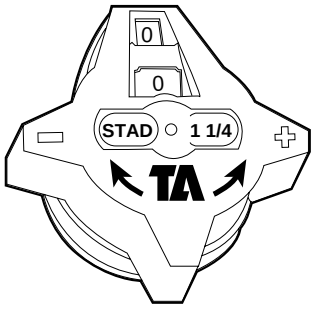
Drain Kit

STAD Series 787 &
STAS Series 786
Vic No.: K-000-786-CBV
Can be installed during operation. See below.



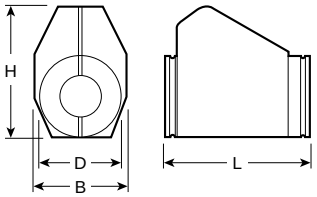
Handwheel

STAD Series 787 &
STAS Series 786
Complete (digital)
Vic No.: P-004-784-001



Prefab Insulation

STAD Series 787 &
STAS Series 786
For heating/cooling



Valve Size In./mm	Victaulic Part Code	Dimensions Inches/mm			
		H	D	B	L
½ & ¾ 15 & 20	K-004-784-INS	5.31 135	3.54 90	4.06 103	5.51 140
1 25	K-010-784-INS	5.59 142	3.70 94	4.06 103	6.30 160
1¼ 32	K-012-784-INS	6.14 156	4.17 106	4.06 103	7.09 180
1½ 40	K-014-784-INS	6.65 169	4.25 108	4.45 113	8.43 214
2 50	K-020-784-INS	7.01 178	4.25 108	4.49 114	9.65 245

INSTALLATION

Drain Kit

STAD Series 787 &
STAS Series 786

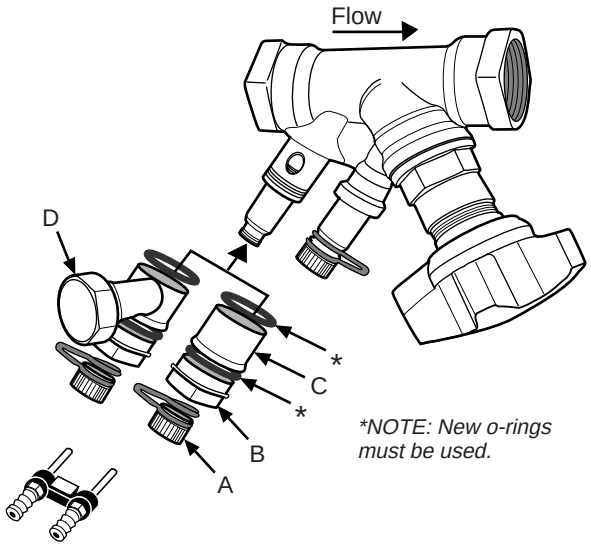
The STAD/STAS drain kit can be installed while valve is in operation.

There is a recess for a 5 mm Allen key under the cover **A**.

Fit drainage nipple by unscrewing cover **A** and nut **B**.

Then pull off sleeve **C** and fit turntable drainage nipple **D**.

Finally refit nut **B** and cover **A**. Turn 8 - 14 turns to drain.



**NOTE: New o-rings must be used.*

www.victaulic.com
Customer Inquiries: pickvic@victaulic.com
Literature Requests: victaulic@victaulic.com

WORLD HEADQUARTERS
P.O. Box 31 • Easton, PA 18044-0031
4901 Kesslersville Road • Easton, PA, USA 18040
Phone: 610/559-3300 • FAX: 610/250-8817

CUSTOMER CARE CENTER
Phone: 1-800-PICK-VIC (1-800-742-5842) • e-mail: pickvic@victaulic.com

VICTAULIC COMPANY OF AMERICA
P.O. Box 31 • Easton, PA 18044-0031
Phone: 610/559-3300 • Fax: 610/250-8817

Fire Protection Division Customer Care Centers

- **SOUTHEAST FIRE PROTECTION**
  Phone: 877/773-8322 • Fax: 877/776-9769
- **NORTHEAST FIRE PROTECTION**
  Phone: 888/265-0805 • Fax: 888/265-0918
- **CENTRAL FIRE PROTECTION**
  Phone: 888/448-3534 • Fax: 888/448-3595
- **WESTERN FIRE PROTECTION**
  Phone: 877/487-7231 • Fax: 877/487-7232

Victaulic Tool Company
P.O. Box 31 • Easton, PA 18044-0031
Phone: 610/559-3300 • Fax: 610/923-3090

Victaulic Municipal Division
1818 Vultee Street • Allentown, PA 18103
Phone: 610/559-3488 • Fax: 610/923-3170

Victaulic Construction Piping Services
1818 Vultee Street • Allentown, PA 18103
Phone: 610/559-3488 • Fax: 610/923-3170

United States Distribution Centers

- **NEW ENGLAND/NEW YORK METRO**
  4901 Kesslersville Road • Easton, PA 18040
  Cust.Care: 800/742-5842 • Cust. Fax: 800/437-6573
- **SOUTHEAST**
  650 Coastline Drive • Yulee, FL 32097
  Cust.Care: 800/742-5842 • Cust. Fax: 888/201-3468
- **MIDWEST**
  730 Thomas Drive • Bensenville, IL 60106
  Cust.Care: 800/742-5842 • Cust. Fax: 888/265-2018
- **GREAT LAKES**
  23107 Commerce Drive • Farmington Hills, MI 48335
  Cust.Care: 800/742-5842 • Cust. Fax: 800/564-0119
- **CENTRAL STATES**
  5900 Deramus Avenue • Kansas City, MO 64120
  Cust.Care: 800/742-5842 • Cust. Fax: 888/448-3540
- **MID-CONTINENT**
  7177 Railspur Street • Houston, TX 77078
  Cust.Care: 800/742-5842 • Cust. Fax: 888/448-3537
- **PERMIAN BASIN**
  2628 Remington Road • Odessa, TX 79763
  Local Tel.: 915/332-1489 • Local Fax: 915/332-4924
- **ROCKY MOUNTAIN**
  5045 Paris Street • Denver, CO 80239
  Cust.Care: 800/742-5842 • Cust. Fax: 888/448-3528
- **PACIFIC - NORTH**
  22633 83rd Ave. So. • Kent, WA 98032
  Cust.Care: 800/742-5842 • Cust. Fax: 888/448-3530
- **MID-ATLANTIC**
  4901 Kesslersville Road • Easton, PA 18040
  Cust.Care: 800/742-5842 • Cust. Fax: 800/696-6447
- **PACIFIC - SOUTH**
  20934 So. Santa Fe Ave. • Long Beach, CA 90810
  Cust.Care: 800/742-5842 • Cust. Fax: 800/448-3542

VICTAULIC COMPANY OF CANADA
65 Worcester Road • Rexdale, Ontario • Canada M9W 5N7
Phone: 416/675-5575 • FAX: 416/675-5565 • e-mail: viccanada@victaulic.com

Canadian Sales Offices and Service Centers

- **EASTERN**
  975 rue Selkirk • Pointe Claire, QC H9R 4S4
  Phone: 514/426-3500 • FAX: 514/426-2818
- **ONTARIO - NORTH**
  1070 Elisabella Street • Sudbury, ON P3A 5K2
  Phone: 705/560-9595 • FAX: 705/560-9490
- **PACIFIC**
  Unit 5, 7560 Vantage Way • Delta, BC V4G 1H1
  Phone: 604/940-3301 • FAX: 604/940-3360
- **ONTARIO - SOUTH**
  65 Worcester Road • Rexdale, ON M9W 5N7
  Phone: 416/675-5575 • FAX: 416/675-5729
- **WESTERN**
  11659 180th Street NW • Edmonton, AB T5S 2H6
  Phone: 780/452-0680 • FAX: 780/452-2430

VICTAULIC INTERNATIONAL
P.O. Box 31 • Easton, PA, USA 18044-0031
4901 Kesslersville Road • Easton, PA, USA 18040
Phone: 610/559-3300 • FAX: 610/559-3608
e-mail: vicintl@victaulic.com

VICTAULIC AMERICA LATINA
P.O. Box 31 • Easton, PA, USA 18044-0031
4901 Kesslersville Road • Easton, PA, USA 18040
Phone: 610/559-3300 • FAX: 610/559-3608
e-mail: vical@victaulic.com

VICTAULIC EUROPE
Prijkelstraat 36
9810 Nazareth Belgium
Phone: 011-32-93-811500 • FAX: 011-32-93-804438

VICTAULIC ASIA-PACIFIC
541 Orchard Road, #14-02, Liat Towers
Singapore 238881
Phone: 011-65-235-3035 • FAX: 011-65-235-0535