INCENTIVE GROUP

STAD/STAS/TBV-S

5-5-10

Balancing valves

1994.01

General

STAD and STAS

Drain option:
- Valves with a drain fitting for hose connection include a protective cap.
- Valves without drain fitting have a sleeve.

This sleeve can be temporarily removed during operation. A drain fitting can be installed (available as an accessory).

Test points:
The test points for temperature and pressure measurement are self-sealing. Release cover for measurement and leave in its security band. Insert the measuring probe through the self-sealing EPDM rubber measurement point.

Technical description

STAD and STAS

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

Functions:

STAD	Shut-off, draining (optional), pre-setting of flow, flow measuring, pressure reading. NPT threads.
STAS	Shut-off, draining (optional), pre-setting of flow, flow measuring and pressure reading solder ends.

Nominal working pressure: 300 psi.
Nominal working temperature: 250°F (120°C).
Min. working temperature: -22°F (-30°C).

Material: The valves are made completely of AMETAL® and are fitted with a red nylon handwheel and a protection cap. Seat sealing: stem with ring of PTFE. Stuffing box, gaskets: non-asbestos. Prefab insulation of polyurethane.

Threads:	Internal 1/2 NPT - 2 NPT. (STAD)
Solder ends:	Internal 1/2 - 2. (STAS)

Technical description

TBV-S

Application:
Heating and cooling installations.

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

Nominal working pressure: 125 psi.

Nominal working temperature: 250°F (120°C).

Sizes: 1/2" and 3/4" solder style.

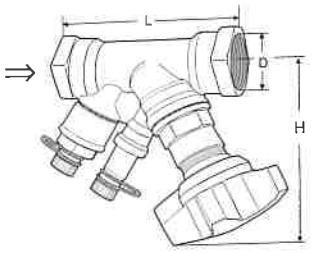
Material:
The valves are made completely of AMETAL® and delivered unassembled.

Fittings:
The test points feature self-sealing construction for insertion type pressure or temperature probes. A protective cap is included.

USA: Tour & Andersson, Valve Division, exclusively distributed by DUNHAM-BUSH, Inc., 811 E. Main Street, MARSHALLTOWN, Iowa 50158
Tele (515) 752-4291, Fax (515) 753-0496
CANADA: Tour & Andersson Ltd, 7490 Pacific Circle at Tomken, MISSISSAUGA, Ontario L5T 2A3, Tel. (416) 670-9015, Fax (416) 670-9022

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

Without drain*

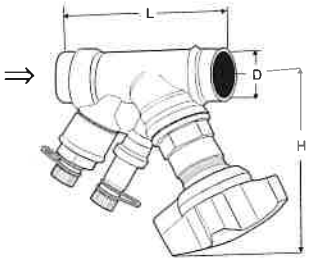


TA No	Size	L	H	D
52 161 -514	1/2"	3 1/2	4	1/2"
-520	3/4"	3 13/16	4	3/4"
-525	1"	4 5/16	4 1/2	1"
-532	1 1/4"	4 7/8	4 5/16	1 1/4"
-540	1 1/2"	5 1/8	4 3/4	1 1/2"
-550	2"	6 1/8	4 3/4	2"

⇒ = Flow direction

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

Without drain*

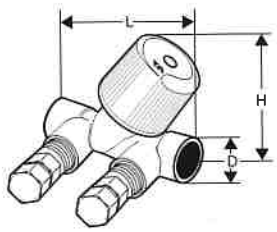


TA No	Size	L	H	D
52 161 -914	1/2"	3 1/2	4	1/2"
-920	3/4"	3 13/16	4	3/4"
-925	1"	4 5/16	4 1/2	1"
-932	1 1/4"	4 7/8	4 5/16	1 1/4"
-940	1 1/2"	5 1/8	4 3/4	1 1/2"
-950	2"	6 1/8	4 3/4	2"

⇒ = Flow direction

***) With drain optional. The drain option is available for sizes 1/2" - 2" STAD/STAS**

TBV-S: For shut-off, pre-setting of flow, flow measuring and pressure reading. Solder ends



TA No	Size	L	H	D
52 168 -015	1/2"	2 5/8	2 7/8	1/2"
-020	3/4"	3 5/32	2 9/16	3/4"

Pre-setting STAD, STAS

Initial setting of a valve for a particular pressure drop, e g corresponding to 2.3 turns on the graph, is carried out as follows:

1. Close the valve fully (Fig 1).
2. Open the valve to the pre-set value 2.3 turns (Fig. 2).
3. Remove the handwheel screw without changing the setting, using an Allen key (3 mm).
4. Turn the inner stem clockwise until the stop is reached with the same Allen key (long end), and refit the handwheel screw.
5. The valve is now pre-set.

To check the pre-setting of a valve, open it to the stop position; the indicator then shows the pre-setting number, in this case 2.3 (Fig. 2).
As a guide in determining the correct valve size and setting (pressure drop) there are graphs for each size of valve showing the pressure drop at different settings and water flows.

Delivery setting
The valve can be opened 4 turns max. (fig 3). Opening it further will not increase the capacity.

Locking
The handwheel screw may be locked as in fig. 2.

Fig 1
Valve closed

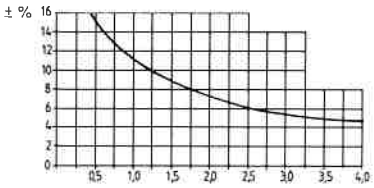
Fig 2
The valve is pre-set 2.3

Fig 3
Fully open valve

Measuring accuracy

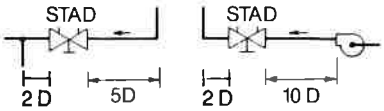
A valve that operates at a high flow capacity naturally has a large cross-section area when fully open.
The level of accuracy is highest when the valve is open. The smaller the valve opening, the greater the importance of manufacturing tolerances, since the variation in measurement is greater on a percentage basis.
In installations, the following maximum deviations can be expected.

Deviation of flow with different pre-setting



Pre-setting, No. of turns

The curve holds for valves mounted at the specified flow direction*) with normal pipe fittings. Avoid mounting taps and pumps, which may cause turbulence, immediately before the valve. Turbulence for valves due to elbows or reducers lead to measuring errors which are most important when the balancing valve is in the open position.
The influence may in the worst of cases, be as much as 20 % in the fully opened position.



*) The valve can be mounted with reverse flow direction. The given flow specifications also apply to this direction, but the deviations will be larger (max. 5% more).

Correction factors

For liquids other than water the values from the CBI can be adjusted as follows: Change the flow with a factor which depends upon the specific gravity.

Flow read off from the CBI = q_{CBI}

$$\text{Actual flow} = \frac{q_{CBI}}{\sqrt{\gamma}}$$

This applies to liquids having on the whole the same viscosity (≤20 cSt = 3°E = 100 S.U.) as water, i.e. most water/glycol mixtures and water/brine solutions.

Sizing a balancing valve

When balancing hydronic systems or for precalculation, the following values and formulas for valve resistance should be used.

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

$$Cv = 1.52 \frac{q}{\sqrt{\Delta p}}$$ q GPM, Δp, Ft

$$Cv = \frac{q}{\sqrt{\Delta p}}$$ q GPM, Δp, psi

2. When flow is known and the Δp is unknown the table below will serve as a general guide.

Size	Cvs	Water flow range for Δp 1 Ft at valve fully open	Water flow range for Δp 2 Ft at valve fully open
		GPM	GPM
TBV-S			
1/2"	3.25	0.5 - 2.5	0.5 - 3
3/4"	4.52	2.5 - 3.5	3 - 4
STAD/STAS			
1/2"	2.92	0.5 - 2	0.5 - 2.8
3/4"	6.61	2 - 4.5	2.8 - 6
1"	10.09	4.5 - 7	6 - 10
1 1/4"	16.5	7 - 11	10 - 15
1 1/2"	22.3	11 - 16	15 - 20
2"	38.3	16 - 26	20 - 36

Cv-values for various pre-setting. TBV-S

Size	Number of turns						
	0.25	0.3	0.35	0.4	0.5	0.75	1
1/2"	0.41	0.72	1.03	1.34	1.97	3.02	3.25
3/4"	0.58	0.95	1.32	1.70	2.44	4.18	4.52

Cv-values for various pre-setting. STAD/STAS

Number of turns	Size					
	1/2"*	3/4"	1"	1 1/4"	1 1/2"	2"
0.5	.147	.593	.70	1.32	2.03	2.97
1	.246	.878	1.19	2.20	3.83	4.87
1.5	.364	1.38	2.44	3.60	5.34	8.35
2	.662	2.20	4.20	5.40	7.08	13.6
2.5	1.02	3.24	6.15	8.24	10.21	18.8
3	1.60	4.49	8.00	11.00	14.6	24.9
3.5	2.30	5.51	9.28	13.70	18.6	30.7
4	2.92	6.61	10.09	16.50	22.3	38.

*) 1/2" valves are marked DN 14/15 on the handwheel screw.

Cv is the flow through the valve in GPM when Δp across it is 1 psi (2.31 Ft).

Diagram

This graph shows the pressure drop over the pressure test point of the valve.

A straight line connecting the bars for flow rate, Cv 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 Cv value obtained.

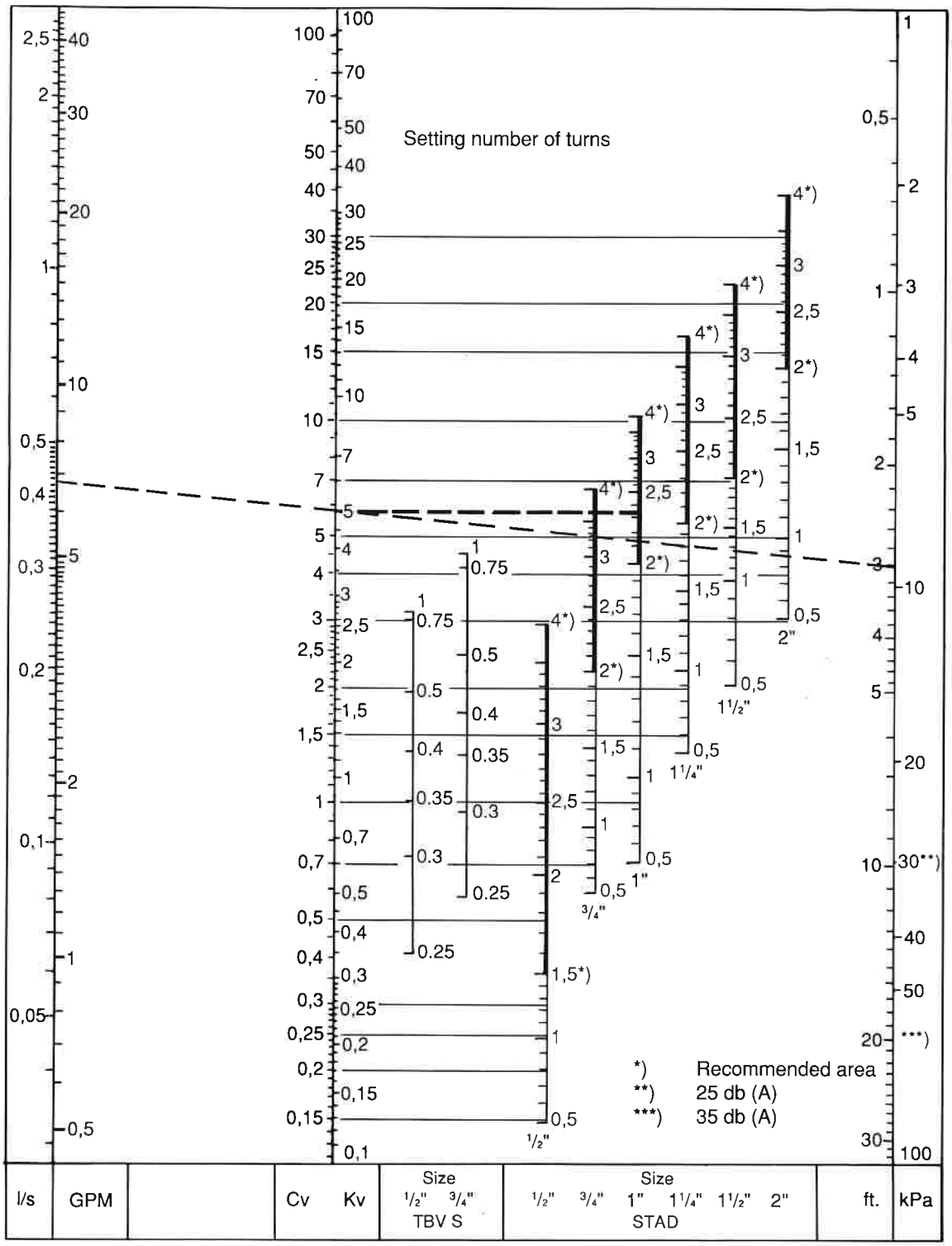
Example

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

Circular slide rule

By using the circular slide rule you can easily find the relationship between flow rate, pressure and settings for all sizes of TBV-S, STAD, STAS, STAF and STAG valves. Order the slide rule from your nearest TA office.



1/2" STAD valves are marked DN 14/15 on the handwheel screw.

Regulating of waterflow

The actual pressure drops in water distribution pipework are difficult to calculate accurately. This means that in practice, the flow rate, and consequently the caloric distribution, is often incorrect. With the STAD valve, however it is easy to set the desired flow rate.

Preparations for measuring

Valve
Open the valve to the desired pre-setting, e.g. 2.3 by turning the handwheel until the upper scale reads 2 and the lower 3.
Meter
Use electronic differential pressure meter CBI. The CBI is pre-programmed with the duty curves for TA valves STAD so that the registered differential pressure can be read directly as flow rate. More information about the CBI is found in bulletin 9-5-5.

Adjustment - working procedure

In the handbook "Total Balancing" the working procedure is described in more detail. Below is a short summary. Pre-set all valves according to the drawing (radiator valves for ΔP = 3 Ft). Be sure that all two-way balancing valves and radiator/thermostatic valves are open. Reduce the temperature so that self-actuating valves open. In the TA-method, you select the farthest valve in each circuit as a reference valve. Using the main valve for the entire circuit, maintain a constant differential pressure (1 Ft) at the reference valve and adjust the correct flow rate for the remaining valves in this circuit in order, starting with the valve farthest from the pump. When all the risers are done, adjust the headers in the same way. When the adjustment for the entire installation is completed, all the valves have the correct flow rate and all the set values are locked and recorded. If it was necessary to partly shut a valve before the pump, the pump should be adjusted or replaced with a pump of the correct capacity and the valve be reopened.

TA retains the right to make changes to its products and specifications without prior notice.

Björsells Tryckeri