

## Valve Selection

### Cooling-Water Control Valves Gestramat CW 41, CW 41/4 PN 16, DN 25 – 100 mm (1 – 4")

#### 1. Selection of Valve Type in accordance with Cooling Medium

Cooling medium	Valve type
Industrial cooling water	CW 41
Ammoniacal water, salt water, chlorinated hydrocarbons	CW 41/4

#### 2. Selection of Thermostat / Cone Combination

##### Simplified method

In practice – for existing plants – the thermostat/cone combination can, as a rule, be selected against the desired cooling-water outlet temperature.

Desired cooling-water outlet temperature	Thermostat/cone combination
20 to 60 °C (68 to 140 °F)	wr
50 to 100 °C (122 to 212 °F)	nr
-32 to +30 °C (-25 to +86 °F)	kr

Calculation method see opposite (2.1).

#### 3. Nominal Size (DN)

The size of the cooling-water control valve should, where possible, correspond to that of the adjacent pipework. When applying the simplified selection method for the valve/cone combination, usually the pipe size can also be taken as valve size.

The following sizes are available:

DN 25, 40, 50, 80, 100 mm (1, 1½, 2, 3, 4").

#### 4. Connections

Flanges to DIN 2533 (BS 4504) PN 16.

On request at extra cost, flanges drilled to ANSI 125/150.

#### 2.1 Selection of Thermostat / Cone Combination by means of Calculation

With this calculation the thermostat/cone combination is determined in accordance with full operational data.

##### Calculation method

a) Actual cooling-water outlet temperature in summer?

$$t_0 = \dots\dots\dots \text{°C}$$

Cooling-water inlet temperature in summer?

$$t_1 = \dots\dots\dots \text{°C}$$

Maximum admissible cooling-water outlet temperature?

$$t_{cw} = \dots\dots\dots \text{°C}$$

Hence:

Actual temperature difference $\Delta t_1 = t_0 - t_1 = \dots\dots\dots \text{K}$
Desired temperature difference $\Delta t_2 = t_{cw} - t_1 = \dots\dots\dots \text{K}$

b) Service pressure in the cooling-water feed line?

$$p_1 = \dots\dots\dots \text{ barg}$$

Back pressure in the cooling-water return line?

$$p_2 = \dots\dots\dots \text{ bar}$$

Level difference between the measuring points for service pressure and back pressure?

$$\text{Height of fall } h_1 = \dots\dots \text{ m} \cong p_{h1} \dots\dots \text{ bar}$$

or

$$\text{Height of lift } h_2 = \dots\dots \text{ m} \cong p_{h2} \dots\dots \text{ bar}$$

Calculate the differential pressure as follows:

$\Delta p = p_1 + p_{h1} = \dots\dots\dots \text{ bar}$
or
$\Delta p = p_1 - p_{h2} = \dots\dots\dots \text{ bar}$

c) Actual uncontrolled cooling-water flowrate of plant?

$$\dot{V} = \dots\dots\dots \text{ m}^3/\text{h}$$

or

maximum amount of heat to be evacuated?

$$Q = \dots\dots\dots \text{ kJ/h}$$

Calculation of  $k_v$  value:

$k_v = \frac{\dot{V}}{\sqrt{\Delta p \left[ \left( \frac{\Delta t_2}{\Delta t_1} \right)^2 - 1 \right]}} = \dots\dots\dots \text{ m}^3/\text{h}$
or
$k_v = \frac{Q}{4.2 \cdot 10^3 \sqrt{\Delta p (\Delta t_2^2 - 9)}} = \dots\dots\dots \text{ m}^3/\text{h}$

d) With the aid of  $\Delta t_2$ ,  $k_v$ ,  $t_{cw}$  and the nominal size (DN) the code letters for the thermostat/cone combination can be found in the charts on the back.

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#### Charts for the determination of the code letters for the thermostat / cone combination

##### Example 1

The code letters for a cooling-water control valve CW 41 are required, operating data as follows:

$\Delta t_2 = 14 \text{ K}$   
 $k_v = 15 \text{ m}^3/\text{h}$   
 $t_{\text{cw}} = 40 \text{ }^\circ\text{C}$   
 Nominal size DN 50 mm

##### Solution

The point of intersection between  $\Delta t_2 = 14$  and  $k_v = 15$  in the chart for DN 40, 50 mm falls into the common range for the code letters ws, ns, ks.

According to the temperature:

ws	for $t_{\text{cw}} = 20$ to $60 \text{ }^\circ\text{C}$
ns	for $t_{\text{cw}} = 50$ to $100 \text{ }^\circ\text{C}$
ks	for $t_{\text{cw}} = -32$ to $+30 \text{ }^\circ\text{C}$

As  $t_{\text{cw}} = 40 \text{ }^\circ\text{C}$ , choose code letters ws in this case.

##### Example 2

If the point of intersection between  $\Delta t_2$  and  $k_v$  falls into the range wr, nr, kr, choose:

wr	for $t_{\text{cw}} = 20$ to $60 \text{ }^\circ\text{C}$
nr	for $t_{\text{cw}} = 50$ to $100 \text{ }^\circ\text{C}$
kr	for $t_{\text{cw}} = -32$ to $+30 \text{ }^\circ\text{C}$

#### Enquiry Specification

GESTRA cooling-water control valve Gestramat CW 41 or CW 41/4. With solid-state thermostat(s), double-seat valve cone, pressure gauge, and thermometer.

#### Order Specifications

Valve type, thermostat/cone combination, nominal size (DN), connections (see "Valve Selection").

Type of cooling agent, inlet pressure, back pressure, uncontrolled coolant flowrate or heat amount to be discharged.

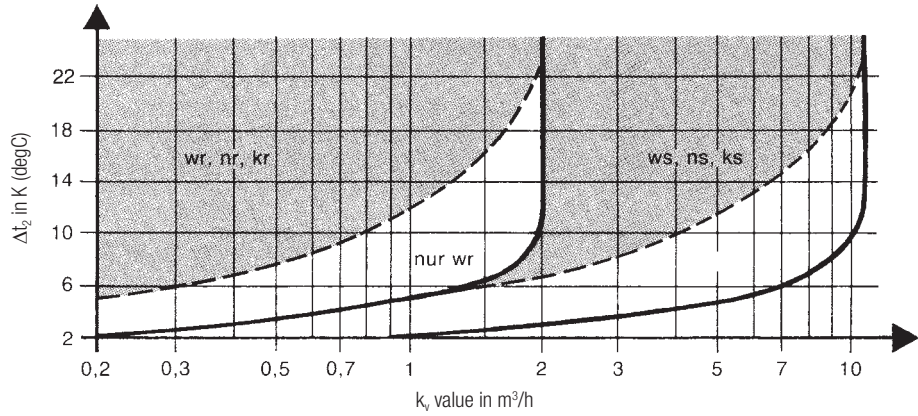
#### Note concerning valve cone selection:

If the nominal size of the valve has not yet been determined (see also point 3) the point of intersection  $\Delta t_2/k_v$  can usually be found in several charts.

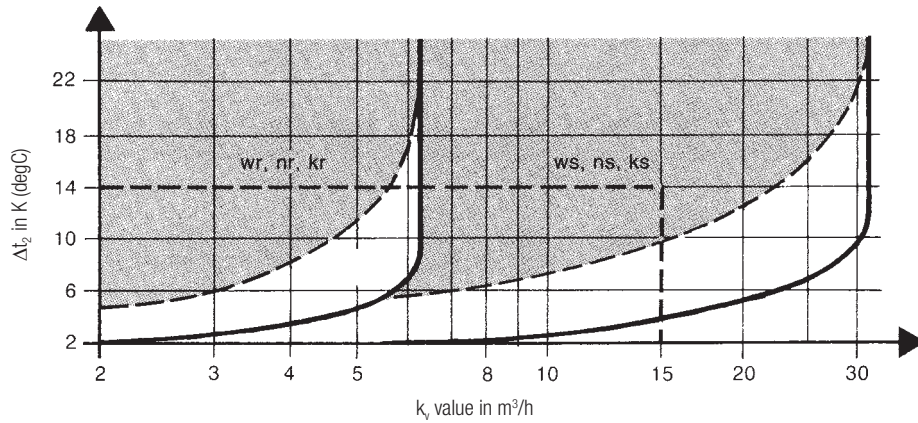
In this case choose the valve cone with the slightest bleed flow (see  $k_{v0}$  value under "Technical Data" in data sheet CW 41, CW 41/4).

Supply in accordance with our general terms of business.

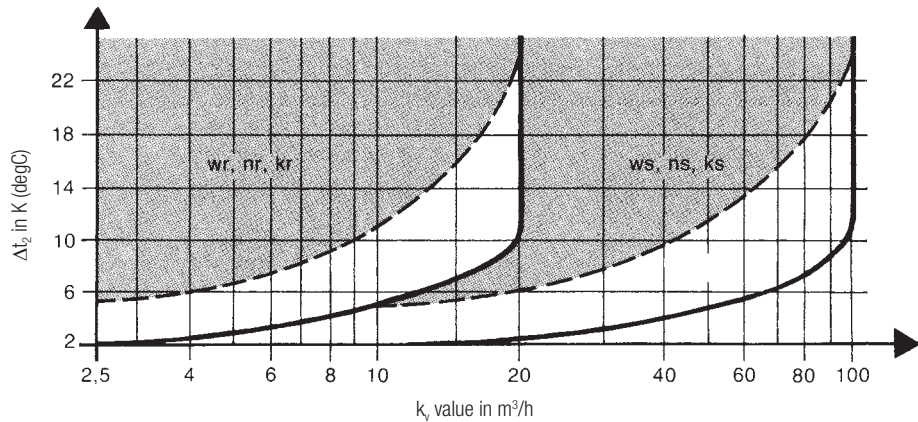
#### DN 25 mm (1")



#### DN 40, 50 mm (1½, 2")



#### DN 80, 100 mm (3, 4")



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