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SOME CONSIDERATIONS IN CHOOSING THE SIZE OF DAMPENERS: HOW TO REDUCE THE COST WHEN A PULSATION DAMPENER IS NEEDED IN A VOLUMETRIC PUMP

I) As you probably know, the narrower the % values of the residual pulsation admitted are, the higher is the pulsation dampener size, and consequently the higher is its price.

II) But how do you choose this percentage? Only in those circuits where is installed a measurement device that needs a determined range of pressure variability to work properly, this variability will be the percentage of residual pulsation that the dampener must regulate.

III) In the other cases the residual pulse can be higher, without creating any trouble in the circuit, and in that way the dampener price will be reduced.

IV) You always ought to take in consideration the following:

a) Do not choose a lower percentage of dumping (less than 2%) in case of: There is variability of temperature (ambient or in the pumped liquid).

b) The pressure in the circuit changes according to the process requirements.

c) Remember that:
In circuits working at low pressure, for instance 5 bar, the pressure picks for the following percentages are:

- **2.5%** ---------- + 0.12 / - 0.12 and the pressure variation 5.12 / 4.88
- **5%** ---------- + 0.25 / - 0.25 and the pressure variation 5.25 / 4.75

And so on…

As you see, the difference in taking a residual pulsation percentage of 5%, instead 2.5% there is only a final pick pressure value of +/- 0.13 bar.

d) Not let us see how changes the dampener size, with those two percentage values. As an example we suppose a circuit with a single piston pump, of 300 litres per hour at 100 r.p.m.:

The pump volume per stroke is:

$$(300 \times 100) / (100 \times 60) = 50 \text{ c.c.}$$

and because is a single piston pump, the $\partial V = 25$ c.c. (*).
The abbreviated formula to calculate the dampener size is:

$$(*)\ V_0 = (\partial V \times P_2) / 0.8 \times (P_2 - P_1)\ ;\ (p \times v = \text{constant}) : \text{where :}$$

V_0 = dampener size
∂V = volume of liquid stored and discharged to the circuit in the pump suction stroke cycle
P_2 = max. pressure accepted
P_1 = min. pressure accepted

With a residual pulsation of +/- 2.5% the dampener size will be:

$$V_0 = (25 \times 5.12) / 0.8 \times (5.12 - 4.88) \approx 667 \text{ c.c.}$$

We will choose our dampener size U007….

And with a residual pulsation of +/- 5% the dampener size will be:

$$V_0 = (25 \times 5.25) / 0.8 \times (5.25 - 4.75) \approx 328 \text{ c.c.}$$

And in this case the dampener size will be our model U003….
Whit this size the picks of pressure are 0.13 bar higher but the dampener size has been reduced about the half.

(*) See out technical article regarding dampener size calculations.

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