

Example 3

Two light industrial factories, located side by side, have requested gas service. The utility deems it economical to install a branched service for these two customers. The footages (including fitting allowance) and gas loads are shown in Figure 40. Calculate the pipe sizes for sections A-B, B-C, and B-D such that the pressure drops from A to C and from A to D are both 0.5 in. wc (0.12 kPa).

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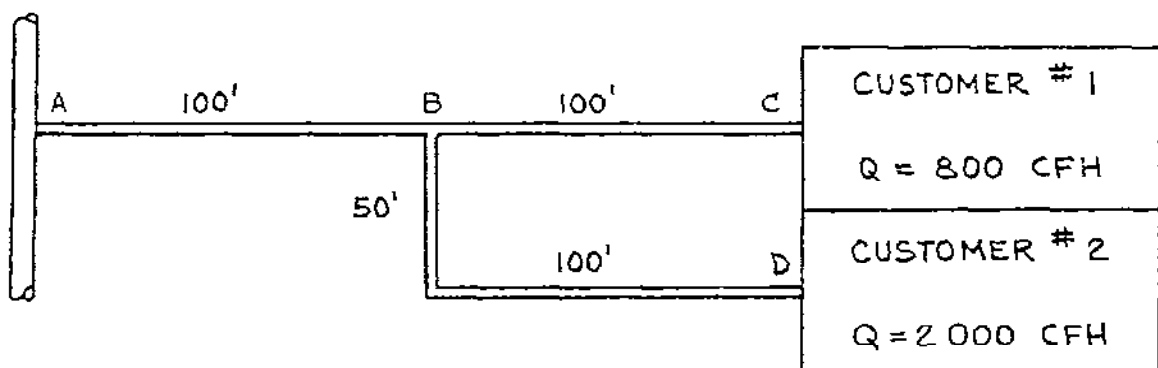


Figure 40. Pipe footages for service described in Example 3.

First, the branch service is separated into two parts as shown in Figure 41 and the two individual services are sized by use of a Hutchinson Calculator No. 2. For Section A to C: $L=200$ ft, $Q=800$ cf/hr, and $\Delta P=0.5$ in. wc; the calculated pipe size is 2.00 in. For Section A' to D: $L=250$ ft, $Q=2\,000$ cf/hr, and $\Delta P=0.5$ in. wc; the calculated pipe size is 2.93 in.

Now, sections A-B and A'-B' are added in parallel to find a single equivalent pipe diameter that has the same total capacity as a 2.00-in. and a 2.93-in. pipe. This can be done as follows:

Select an arbitrary length of pipe and an arbitrary pressure drop, say $L=1\,000$ ft and $\Delta P=1$ in. wc. The capacity of a 2.00-in. pipe under these conditions is calculated to be 470 cf/hr.

Now, using the same values of L and ΔP , the capacity for a 2.93-in. pipe is calculated to be 1 350 cf/hr. The capacities of both pipes are added for a total of 1 820 cf/hr.

Now, the values $L=1\,000$ ft and $\Delta P=1$ in. wc are used again to calculate the pipe size that has a capacity of 1 820 cf/hr; the answer is 3.28 in.

Following these calculations, the available pipe sizes shown in Table 28 can be specified with assurance that the customers will receive adequate delivery pressure. However, if 4-in. pipe were to be specified for the common service (section A-B), less pressure drop could be expected to occur in this section. Thus, an additional drop in both service branches

could be tolerated, perhaps permitting reduction in size of the 2-in. and 3-in. pipes.

Re-calculating the pressure drops based on a 4-in. common service produces the following:

For section A-B:

$L=100$ ft, $Q=2\ 800$ cf/hr (the combination of both customer loads), and $D=4$ in.; the calculated ΔP is approximately 0.02 in. wc. So, the

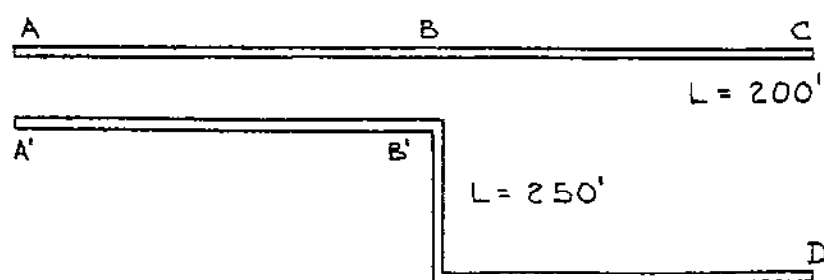


Figure 41. Separation of service described in Example 3.

TABLE 28
Pipe Sizes Calculated and Specified for Example 3

	Minimum Required Pipe Size	Available Pipe Size To Be Specified
Section A-B	3.28 in.	3½ or 4 in.
Section B-C	2.00 in.	2 in.
Section B-D	2.93 in.	3 in.

allowable pressure drop in the remaining branches is $0.5 - 0.02 = 0.48$ in. wc.

For section B-C:

$L=100$ ft, $Q=800$ cf/hr, and $\Delta P = 0.48$ in. wc; the calculated pipe size is 1.75 in., say 2 in.

For section B-D:

$L=150$ ft, $Q=2\ 000$ cf/hr, and $\Delta P = 0.48$ in. wc; the calculated pipe size is 2.65 in., say 3 in.

In this instance, then, nothing is gained by using 4-in pipe for the common service, so the pipe sizes originally calculated should be specified.