Cable Pressurization 1,500/3,000 Foot Manifold Spacing Design

Choosing the Optimum Design

There are many options for designing a cable pressurization system. One design concept is not necessarily best for all wire centers. Variables such as the number of cables, length of runs, duct availability, and existing equipment all must be taken into account during the design process.

Design Criteria

Basically, there are four main criteria to use when determining the best engineering design for an office. A cable pressurization system should be engineered to:

1. Maximize cable protection
2. Monitor all pneumatic sections
3. Provide access points (tools) for leak locating
4. Be cost effective

The number one design priority is to protect the cables, but without a way to successfully monitor them, the system will ultimately fail. Also if the means to efficiently locate leaks is not provided, the system will be expensive to maintain.

Design Concepts

There are two basic design options that apply to most wire centers. each has its own characteristics, benefits, and disadvantages. Both rely upon air pipe to protect the cables, but this is where the similarities end.

6,000 Foot Manifold Spacing

Old Standard

The original Bell Labs air pipe design is based upon spacing air pipe manifolds 6,000 feet apart (see Figure 1). The cables between these sources of air (called a pneumatic section) are monitored by pressure transducers. The flow rates of the manifolds are often monitored by flow transducers, but not always. The primary method of alarming in this type of design is through the monitoring of pressure drop in the cables.

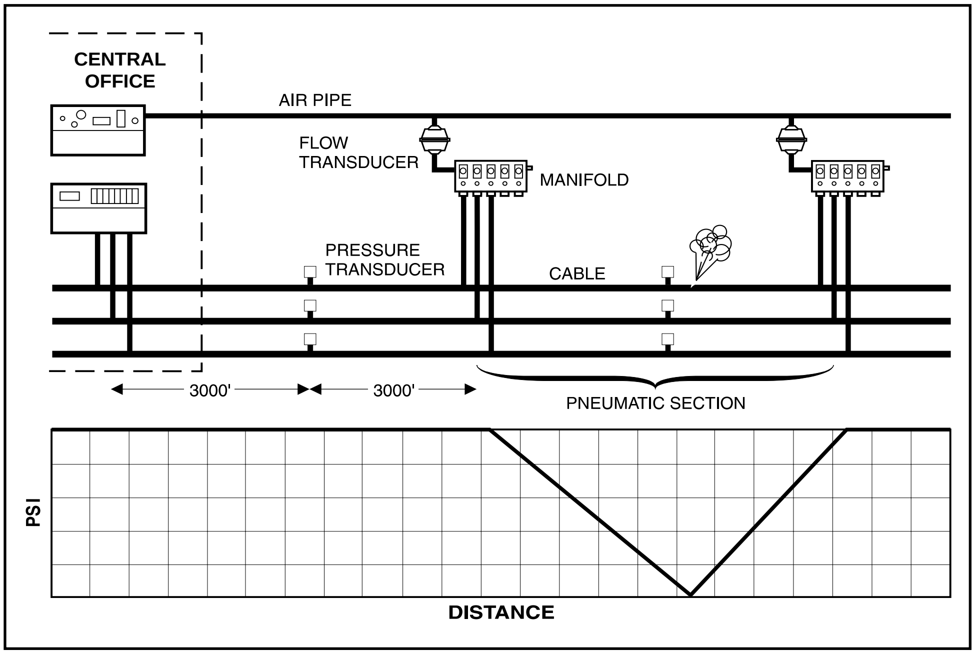

Figure 1

1,500/3,000 Foot Manifold Spacing

New Standard

This design is similar to 6,000 foot manifold spacing except that the midpoint pressure transducers are replaced with an additional air pipe manifold (see Figure 2). In addition, all manifolds are monitored by a flow transducer. The end point of each air pipe is equipped with a pressure transducer (PressureMAP Device Type "EP") to monitor delivery pressure at the end of the route. Cable leaks are measured by air flow increase rather than pressure drop.

Comparing the Two Designs

Based on the goals stated on page 1 for an efficient and cost effective cable pressurization system, the two design types can be compared as follows:

Cable Protection - With twice as many air sources, the 1,500/3,000 foot manifold spacing provides approximately twice the cable protection as the 6,000 foot design. End points of cable runs will have dual feed protection rather than single feed (which is designed into the 1,500/3,000 foot manifold spacing design).

Built-in Buffering

Because manifolds are closer together, the 1,500/3,000 foot manifold spacing design will also provide "built-in buffering" during splicing activity. Also, it is important to note that in many offices—especially large metropolitan wire centers—many cables do not even extend 6,000 feet.

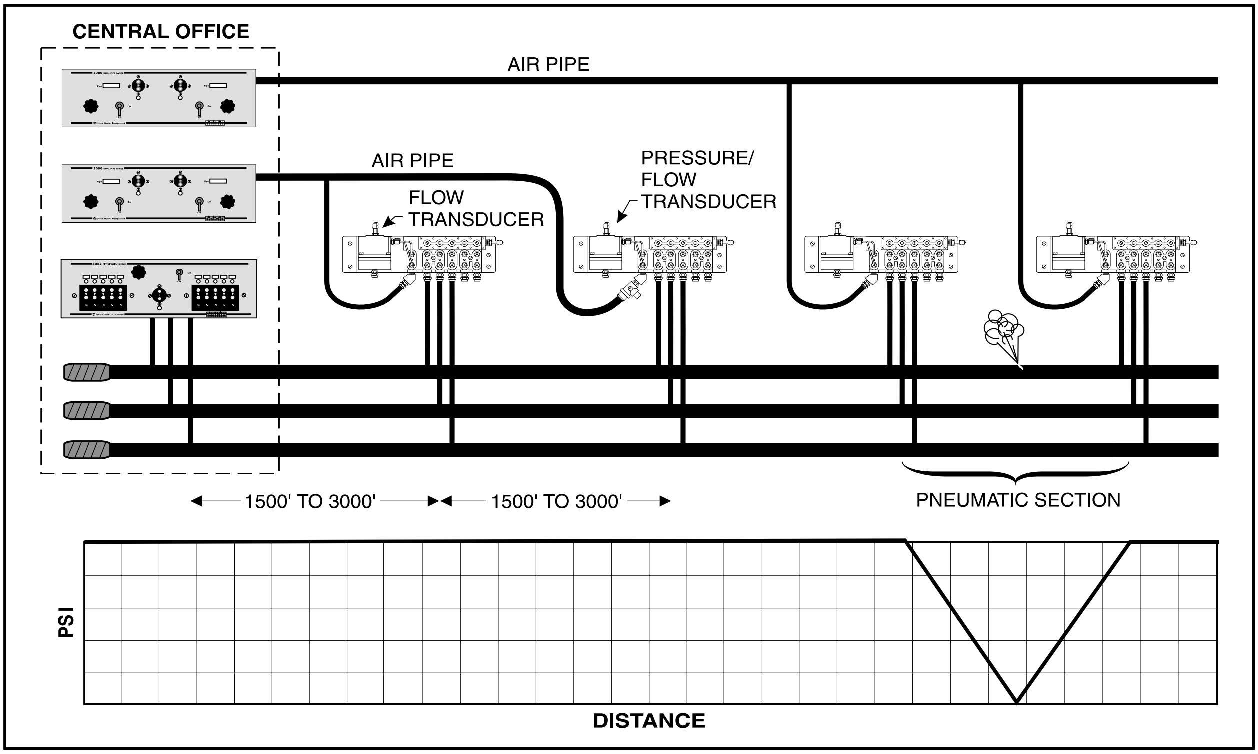

Figure 2

Monitored Pneumatic Sections - There are "pros" and "cons" to each design. The main advantage of the 6,000 foot spacing design is that the analyst can tell during an alarm which cable has the trouble. (Note: this is making the assumption that there is no cable interlacing or stubbing in the system. If there is interlacing, this design is simply ineffective because all midpoint transducers will read the same pressure.)

While the 1,500/3,000 foot design will not tell you remotely which cable has the problem, it will identify where (which access hole) to begin leak locating. This system also works in an interlaced system.

Protection During Alarms

There is one major difference between the two designs: the 6,000 foot spacing design *requires the cable pressures to drop* before an alarm is indicated. The 1,500/3,000 foot manifold spacing relies on air flow increase rather than cable pressure drop. A cable is still protected during an alarm condition.

Air Flow for Prioritizing Leaks

Tools for Leak Locating - Both systems provide tools for leak locating. There is a big advantage to using air flow for monitoring and leak locating. With air flow, you can prioritize the leaks. It must be recognized that there are thousands of cable leaks in each of the wire centers and only a limited amount of labor. The largest, most damaging leaks must be found and repaired first. Smaller leaks will be protected by the system.

While measuring pressure tells the technician/analyst that there is a problem, it does not indicate if the leak is the largest one. Measuring the air consumption (SCFH) of leaks at manifold locations helps to prioritize leaks along the route.

Less Maintenance on Monitoring Devices

Cost Effectiveness - It has been documented that both systems are similar in cost. While the 6,000 foot design requires more monitoring devices (pressure transducers) and associated monitoring pairs, the 1,500/3,000 foot design requires additional air pipe. However, once the system is in place there will be less maintenance required on monitoring devices. With fewer transducers in the system, there are fewer monitoring device-related problems that occur.

The Recommended Air Pipe Design

Better Protection, Monitoring, and Leak Location with 1,500/3,000' Design

When comparing these two designs using the criteria stated, there is no question that the 1,500/3,000 foot manifold spacing design is superior. It provides better protection, better monitoring, and better leak locating. And since many cables in typical larger offices do not even extend 6,000 feet, the shorter manifold spacing assures adequate dual feed protection for these cables.

There is also another important advantage to the 1,500/3,000 foot spacing: as soon as it is installed, cable pressures will improve. With 6,000 foot spacing, you will end up with a significant number of pressure transducers with low readings. And cable protection will not be improved. In fact, in order to build the 6,000 foot system up, a considerable amount of labor hours must be invested.

The 1,500 to 3,000 foot manifold spacing design has emerged as the new standard for dual feed air pipe systems—primarily due to changing times. It offers greater cable protection, requires fewer transducers, and emphasizes a flow-oriented maintenance approach that has proven to be the most successful leak locating method.