

LeakyDuct™



An outstanding software package for designing or auditing auxiliary fan and leaky duct systems

Subsurface ventilation specialists

LeakyDuct™ is a comprehensive software package designed to help ventilation officers and engineers to select the correct auxiliary fan and duct combination for almost any ventilation job in a mine.

LeakyDuct™ provides the following tools in one integrated, user-friendly package written in MS Visual Basic™:

The software allows for both friction losses along the duct *and* leakage through the duct walls. Friction and leakage values can be nominated (typical values are provided) or can be calculated from actual measurements of pressure and flow at two points in the duct. The program has the following features:

- It allows you to find the three fan constants normally used to describe the parabola which can be made to fit almost all fan curves by inputting any four known points (P and Q values) which you supply from the manufacturer's fan curve. You can either use the manufacturer's Fan Static Pressure (FSP) or Fan Total Pressure (FTP) curves. The alternative fan parabola constants are also calculated (e.g if you provide fan pressure in terms of FSP, it additionally gives FTP and vice-versa). This sheet also allows you to find the parabola constants for two or more identical fans in series or parallel, or combinations of series/parallel operation and also allows you to plot the resulting fan curves (FSP or FTP), at any air density. The P and Q values are permanently stored for later reference in a database.
- You can easily find the fan parabola constants for two dissimilar fans in series or parallel (in terms of FSP or FTP). This sheet also has a fan curve plotting routine, and can also be used for combining similar fans where you only have the parabola constants, rather than the P and Q data points. It also allows you to find the fan curve for a single fan feeding two ducts (gives you the effective fan curve for each duct). This is useful for designing split-duct systems where two ducts will be fed from one fan.
- You can calculate duct resistance and leakage factors, including the K factor, by measuring duct P and Q values yourself at two points along the duct. This is useful for characterising duct types and installation quality at your operation.
- It allows you to calculate the leakage factors directly on a particular duct if you know the K factor and the airflow values at the fan and the duct outlet only. This is useful where you are familiar with a particular type of duct and know its K factor, but want to check leakage on a particular fan/duct installation.
- If you know the duct K factor and leakage factors, you can find what fan total pressure, fan static pressure and fan volume you would need to achieve a specific duct discharge volume from a duct of a given length and diameter. In other words, you can quickly see what sort of fan (duty P and Q) would be required for a particular type of duct installation. This allows evaluation of trade offs between number of ducts, duct diameter and length and duct material, and selection of appropriate fans from a manufacturer's catalogue of fan curves and types.
- If you have a single duct of known characteristics and length, and want to replace this with an equivalent installation of two or more ducts, you can find out the length, diameter and other characteristics of the alternative duct installation.
- Any calculations or conversions between K factors, asperity heights (wall roughness), e/D ratios, friction factors, Atkinson resistance values, pressure drops, duct lengths, diameters and air densities can be solved.
- It has a powerful blasting fumes re-entry time calculator that provides re-entry times for development ends based on NO_2 , NO , CO_2 , CO and NH_3 for different types of auxiliary systems, airflows and development rates.
- All your fan and duct constants are stored in an easy-to-use database. Here, you can also plot, at any air density, the fan curve for any fan in the database.
- If you know the fan constants, and the duct resistance and leakage constants, you can find the fan duty point and the duct discharge volume and leakage flows, etc. This is the most common application for the program.
- This software is designed for fans in blowing (forcing) or exhausting configuration. It is not designed for fans located in the middle of a duct. It assumes incompressible flow (which generally does not introduce any significant error for fan pressures up to 5 kPa [i.e. 5% of standard atmospheric pressure of 101.325 kPa]). It assumes the ambient air near the fan inlet is at the same pressure as the ambient air near the duct outlet.

LeakyDuct™ was developed by Mine Ventilation Australia and is available for A\$295 plus GST. **LeakyDuct™** requires MS Windows™ and Excel 2000™ or later as a platform. An evaluation version is also available free of charge via -email on application. Ph +61(0)7 3269 3733 or e-mail mvamail@mvaust.com.au.