



Dear readers,

Here is our CETA newsletter no. 10, issued for the CONTROL 2008 trade fair. Our practical tip will deal this time with the leak rate formula and the different possibilities of graphical representation.

Wishing you a pleasant reading,  
Yours faithfully

*Günter Groß*  
Managing Director

## Contents

- CETA customer survey: We value your opinion!
- Mobile leak test system for pneumatic circuits of utility vehicles
- CETA in-house: New team members
- CETA job posting: Employee for the service department
- CETA practical tip: Nomogram for graphical representation of leak rate formula

## CETA customer survey: We value your opinion!

In the course of a survey on customer satisfaction, we are very interested to know your opinion. We will use your feedback as an opportunity for improvement and changes, in order to be even better adapted to our customers' needs regarding products, services and solutions. For this reason, we invite you to give us a frank and straightforward answer. Even criticism is expressly desired. You are also welcome to convey suggestions and wishes. We assure you we will examine all your answers and give you a feedback regarding your suggestions. The questionnaire will be handed over to you in the course of discussions with your project manager, during servicing in your company, or at the trade fair. If you do not have it yet, we will be glad to send it to you (an e-mail to [sales@cetatest.com](mailto:sales@cetatest.com) or a phone call to 02103/2471-75 will be enough).

## Mobile leak test system for pneumatic circuits of utility vehicles

During the manufacturing process of utility vehicles, the whole pneumatic system of the vehicle, consisting of three circuits, is filled to different pressures (up to 12 bar). The pressures of the pneumatic circuits must remain within specified tolerances and the circuits must be leakproof. A special mobile multi-channel testing system, specially developed for this application, allows to perform pressure-monitoring and leak-testing on several hundred vehicles a day within the manu-



facturing cycle. The maximum tolerated pressure loss is only 5 Pa/s (according to the type of vehicle). The pressure loss is measured by three leak detectors, type CETATEST 710, with a pressure range of 16 bar. The test devices are centrally controlled by an industrial PC with touch screen. The pneumatic circuits are pre-filled with compressed air to the respective target pressure and are then checked by the test system. After selection of the type of vehicle and testing program, the testing process runs fully automatically. The measuring hoses are 10 m long, rollable, and provided with quick connectors. Before being connected to the pneumatic circuits of the vehicle, the measuring hoses are brought to the pressure level of the respective circuits. The end of this process is marked by a signal. The leak test starts. The test result is analyzed (pass / fail), documented, printed by a label printer, and can be retrieved by an ethernet interface



++++ CETA newsletter no. 10 of 21.04.2008 +++++

**CETA in-house: New team members**

Since March 1st, 2008, CETA has recruited a new employee for the North sales area; he has extensive experience in the field of industrial solution engineering. The area of technical internal sales was also strengthened with a colleague who has many years of experience in special machine construction. After successfully completing her training at CETA as an office communication clerk, we took the graduate on to our commercial sales office on January 29, 2008. We are pleased that we can focus even better on our customers with these personnel reinforcements.

**CETA job posting:  
Employee for the Service Department**

Due to our customers' increasing need for servicing (for example maintenance, factory calibration and DKD calibration, repairs, modifications), we would like to strengthen our service department. You can find the job description and requirement profile for this new position in the download area of our homepage.

[http://www.cetatest.com/daten\\_de.php](http://www.cetatest.com/daten_de.php).

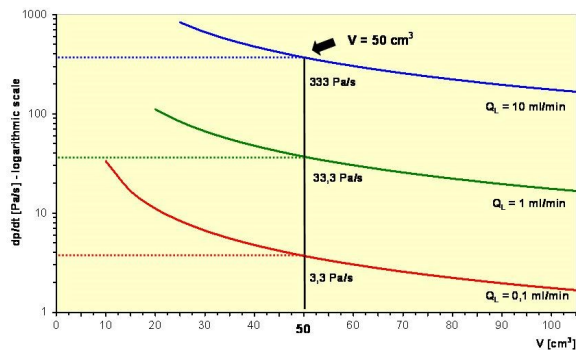
**CETA practical tip: Nomogram for graphical representation of leak rate formula**

Using the leak rate formula, it is possible to estimate if the pressure loss due to the leakage is detectable with relative or differential pressure test devices. The formula can only be used under stable conditions, which are characterized by a time-dependent linear decrease in pressure loss.

$$\frac{dp}{dt} \left[ \frac{\text{Pa}}{\text{s}} \right] = \frac{Q_L [\text{ml/min}]}{V [\text{ml}]} \cdot \frac{100.000 \text{ Pa}}{60 \text{ s}}$$

The time-dependent pressure loss  $dp/dt$  is directly proportional to the leak rate  $Q_L$  and inversely proportional to the effective test part volume  $V$ . The effective test part volume is the sum of test part volume, adaption volume, volume of the pneumatic line between test device and adaption, and internal volume of the measuring circuit of the test device. An adapted diagram is used to illustrate these dependences by means of nomograms. For this, we use the logarithmic application of pressure loss, which, compared to a linear representation, presents the advantage that a large range of values for time-dependent pressure loss can be represented in an easy-to-read way.

Diagram 1: Time-dependent pressure loss  $dp/dt$  (in logarithmic scale)



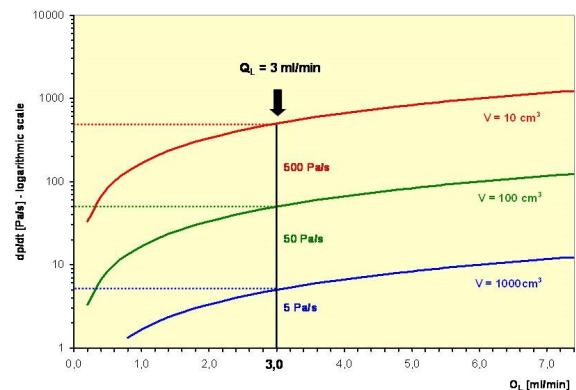
against volume at different leak rates.

In this example, the diagram can be read as follows:

V	$Q_L$		$dp/dt$
50 cm³	10 ml/min	0,16667 mbar*/l/s	333 Pa/s
50 cm³	1,0 ml/min	0,01667 mbar*/l/s	33,3 Pa/s
50 cm³	0,1 ml/min	0,00167 mbar*/l/s	3,3 Pa/s

The leak rate is often given in the unit mbar\*/l/s. The conversion between these two units can be easily calculated:  $Q_L [\text{ml/min}] = Q_L [\text{mbar*/l/s}] \cdot 60$ .

Diagram 2: Time-dependent pressure loss  $dp/dt$  (in logarithmic scale)



against leak rate at different volumes.

In this example, the diagram is read as follows:

$Q_L$	V	$dp/dt$
3,0 ml/min	10 cm³	500 Pa/s
3,0 ml/min	100 cm³	50 Pa/s
3,0 ml/min	1000 cm³	5 Pa/s

Typical application ranges of differential pressure leak detectors are characterized by  $1 \text{ Pa/s} < dp/dt < 75 \text{ Pa/s}$ , whereas relative pressure leak detectors are used from  $dp/dt > 75 \text{ Pa/s}$ . These are approximate values, which are used for a rough orientation. Further parameters for the selection of sensor technology are for example the parameters for cycle time and measuring equipment ability, in the form of the  $C_g$  value. The above-mentioned nomograms can also be found in the download area of our homepage.