CETA® Newsletter

+ + + + + CETA newsletter no. 6 of 26.09.2006 + + + + +

Dear readers,

Here is CETA newsletter no. 6, right on time for the MOTEK 2006 exhibition. This year, like every year, we will exhibit at the MOTEK, from 26.09. till 29.09.2006 in Sinsheim.

You can find us in hall 3, stand no. 3405. We are looking forward to meeting you there and will be glad to present you our newly-developed test unit.

Yours sincerely,

Günter Groß
Managing Director

Contents

CETA newsletter available in English

Due to frequent requests on the part of our customers, especially our international customers and partners, we have decided to issue from now on our newsletter in English language, too. The current newsletter, as well as the ones issued previously, can be downloaded from the English download sector of our internet site.

Data sheets in Russian

From now on, our technical data sheets will also be available in Russian language.

They can be downloaded in the download sector of our internet site.

Job posting at CETA

In the course of our expansion, we currently have a newly-created position to be filled. For our service department, we are looking for an

electronics engineer / mechatronician

for office and field work in Germany and abroad.

You should have completed a technical degree, have a good technical understanding, quickness of mind, and be used to working independently. We expect you to be familiar with all standard computer programs and to command the German and English languages in speech and writing. Your age should be between 22 and 35 years old. It would be ideal (but not a prerequisite) if you had appropriate experience with measurement and test devices.

We offer you an interesting and varied job in a flexible team.

Please send your detailed application with your salary expectation in writing to:

CETA Testsysteme GmbH, c/o Mr. Jünkersfeld, Marie-Curie-Str. 35-37, 40721 Hilden

CETA representatives in Spain and in the Czech Republic

The company Aplival is responsible for servicing in Spain and Portugal. Here is the contact information:

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The company Cressto is responsible for servicing in the Czech Republic and Slovakia. Here is the contact information:

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Motek CETA® Newsletter

CETA inside: Temperature change test

Nothing is more irritating than breakdown of electronic components in a test device which is used in a production line. As a result, production comes to a standstill, since the quality of the produced goods cannot be verified. To prevent such

breakdowns as far as possible, CETA replaced about 2 years ago the hot cabinet used until then for quality control by a temperature change cabinet. Meanwhile, we have experienced positive results, and the investment has proved worthwhile. A number of problems relating to externally acquired electronic components could be detected. This includes cold soldering joints, contact problems with thermal expansion of the circuit board, badly fitting ICs, and hair cracks in the circuit board among other things. This knowledge has been integrated into the manufacturing process of the built-in electronic components, thus improving considerably their quality. Due to the improved supply quality, the duration of the temperature change test could be reduced from the original 48 hours to 24 hours. During the temperature change test, the electronic system of the test device in operation is tested during 24 hours (with simulated pneumatics), the temperature being raised several times in steps of 5°C from 5°C to 60°C and lowered again. All electronic components used as spares are also submitted to this temperature change test. In doing this, we want to make sure prior to delivery that we have done everything possible to prevent such breakdowns during operation.

CETA practical tip: Conversion between liquid and air leak rates

The flow behaviour of gases and fluids is determined by the physical quantity dynamic viscosity ŋ. It has the physical unit N•s/m^2 = kg/(m•s).

Viscosity is the measurement of the flow capability of a medium and is attributed to the inner friction between molecular layers as well as to the inner attractive forces. When the behaviour of a flow is determined by the inner friction, it is called laminar flow, as opposed to turbulent flow. The Reynolds number indicates roughly whether a flow through a pipe is turbulent or laminar. Re = ρ•v•l/η, with v = flow speed in m/s, ρ = density of the medium in kg/m³, and l = pipe length in m. The switch over from laminar to turbulent flow in a smooth pipe occurs at a critical Reynolds number of Re_{crit} ≈ 1000 - 2000. The limit is largely dependent on the state of the pipe wall and the inflow conditions, and can reach in certain cases up to 20000.
When making a leak test with compressed air as test medium, the question of conversion between liquid leak rate q_{liquid} (in ml/min) and gas leak rate $\Delta V/\Delta t_{gas}$ (in mbar•l/s) often arises.
The following formula is used for an estimation:
Example: A positive gage pressure of 2 bar

$$\frac{\Delta V}{\Delta t_{gas}} = q_{liquid} \cdot \frac{p_1 + p_2}{2} \cdot \frac{\eta_{liquid}}{\eta_{gas}}$$

($p_{1,\,abs}$ = 3039 mbar) is applied to a valve. Every 10 minutes, a water drop (Ø 5 mm) is leaking against atmosphere ($p_{2,\,abs}$ = 1013 mbar). This corresponds to a water leak rate of $q_w = 1{,}09*10^{-7}$ l/s or 3,4 l of water per year. With the dynamic viscosity of water and air (at 20°C, $\eta_w = 1{,}002*10^{-3}$ N•s/m^2, $\eta_L = 1{,}815*10^{-5}$ N•s/m^2), we get an air leak rate of ΔV/Δt = 0,012 mbar•l/s (corresponding to an air quantity of 0,72 cm^3/min under normal pressure).
Please keep in mind that these observations apply to ideal conditions (laminar flow, constant capillary leak). In practice, we mostly encounter totally different situations. If the leak is due to microporosities or hairline cracks, or if the leak extends under increased pressure, we are faced with completely different conditions which cannot be quantified in complete form any more. Please note that the viscosity of gases increases with rising temperature. This is due to the increasing thermal molecular movement. On the contrary, the viscosity of liquids decreases with rising temperature. That is why the temperature has to be taken into account.

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