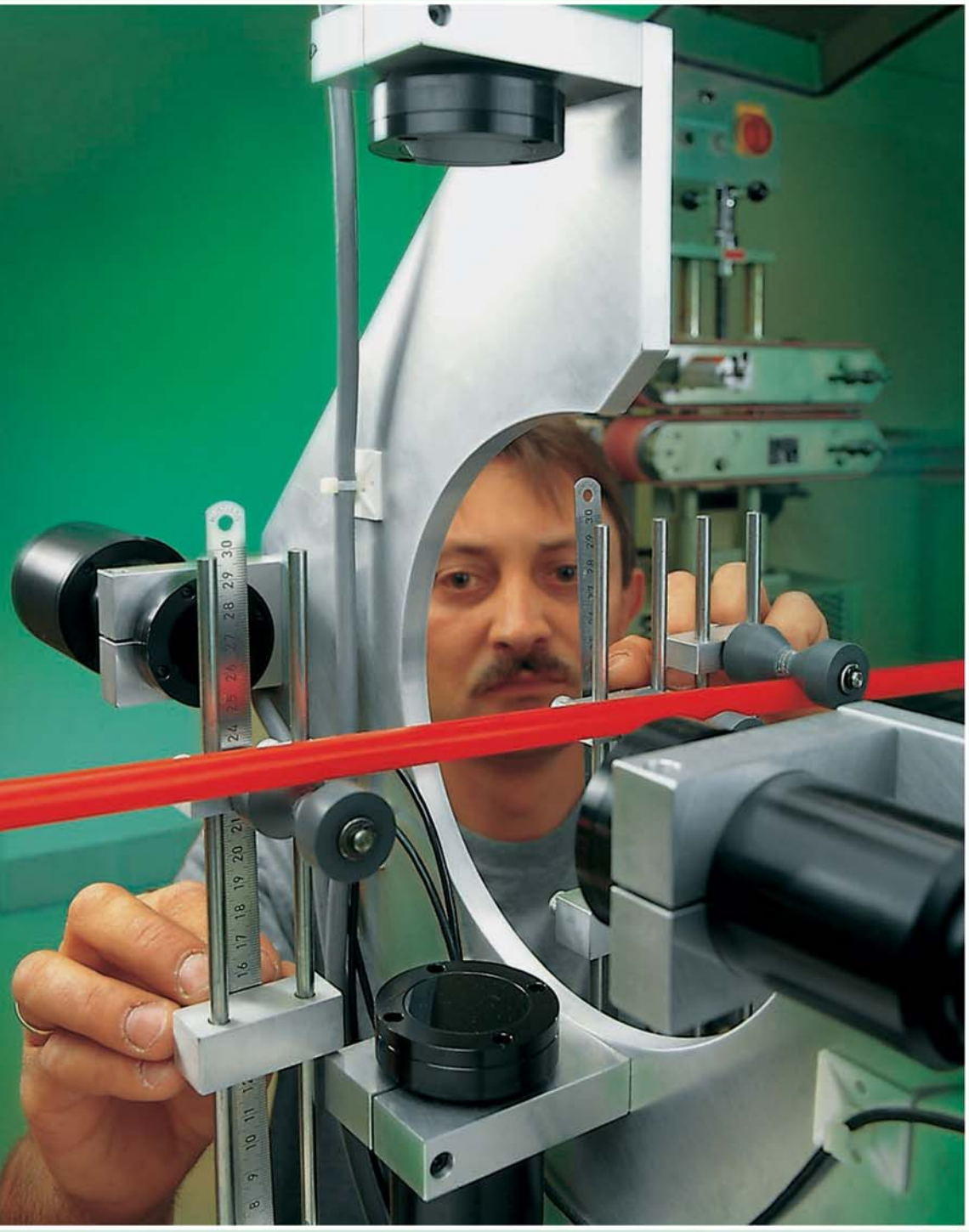

TÜV CERT
DIN EN ISO 9001
Zertifikat: 09 100 6342

PAPUREX

Qualität am laufenden Meter

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Information and Explanations to the data sheets about our products („Datenblatt“) and the corresponding works' standards

Preliminary remarks:
There are data sheets available for all tube sizes in the different material executions.

All specifications have to be considered as user's guidance. Taking into consideration different environmental influences, a general information regarding suitability of the tubes in special fields is not possible.

Such determining factors may be:
- environmental temperature (including e.g. additional intensive sunlight)
- kind of medium running through the tube
- temperature of the medium running through the tube
- mechanical stress (e.g. tensile forces)
- contact with chemicals
- possible level of maximum pressure
- existence of pressure climax for split seconds?
- use of permanent pressure or a big number of loadings

Explanations to the details of our data sheets:
On basis of practical requirements we developed for each kind of examination a special works´ standard which is duly documented. E.g. our customer BOSCH REXROTH AG accepted these examination standards as obligatory.

We would send you descriptions of our works´ standards on demand.

1. Diagram „Mindestberstdruck“, i.e. **minimum burst pressure**
As examination methods of different producers vary on great scale, a comparison not seems useful. Even the results of the same producer without any exact examination standard are not comparable among one another.

If other producers specify a burst pressure, they often refer to test results of a „presentation sample“ of major quality. Or the tube sample are often exposed to a more or less high „pre-pressure“ first, which in most cases flows into the tube very fast on burst pressure tests. The level of pre-pressure and the speed of the

air flowing into the test sample, determines the level of the resulting burst pressure. E.g. if a tube sample is exposed to a pressure of 200 bar and the compressed air is flowing into the tube very fast (without valve), the actual destruction of the tube takes place before the measuring instruments register. This is partly caused by the inertia of the tube material.

Further possibilities to manipulate results of burst pressure tests are to dry the pressure medium, lowering it's temperature or the use of water as pressure medium instead of compressed air.

All burst pressure test results only indicate that a tube burst after x seconds at a inner pressure of y bar. What is the use of such information? Moreover tubes of some materials (e.g. polyether) under pressure first build a "balloon" before they burst finally. In this case the tube material is already damaged before reaching the burst point. The pressure value reached is no sensible data.

And as a final result such a figure only gives the information that a tube, which was exposed to a rapid rising pressure, bursts on a certain level of pressure. More important in modern pneumatic is the specification of a (constant) pressure level, above which the tube becomes damaged. This is what we test under »limit of pressure load depending on the temperature« (see no. 2. below).

Our examination standard:
Our examination standard prescribes a relatively low pre-pressure with an intermediate valve. All tests are to be done at a room temperature of 20°C and neither the compressed air nor the tube should be especially dried before. A representative number of tube samples out of regular production is tested 1 h after production of the tube and the same number 5 h later. Out of the results a mean value of pressure is calculated. To receive the minimum burst pressure we state in our data sheets, we reduce this mean value about 10%. That means, that our diagrams show the pressure level, that would be reached at least by every tube of this dimension, neither depending on the batch of raw material nor fluctuations in production.

2. Diagram „Belastungsgrenze in Abhängigkeit zur Temperatur“, i.e.
limit of pressure load depending on the temperature
We judge these tests having more practical importance: The results show the maximum level of permanent pressure the tube could be exposed to at several temperatures without becoming irreversible damaged.

These results could be used to calculate security rates for different applications.

Our examination standard:
The test starts on exposing a test sample of 200 mm length to a pressure of 6 bar. Every 2 minutes the pressure is risen about 2 bar until the tube bursts. With this method tests are done within the temperature range from 20°C to 80°C (with steps of 10°). 5 minutes after the test temperature is reached, it has to be examined whether the tube stands the pressure load for the 2-minutes-period. Should the tube sample not stand the pressure, the limit of pressure load is the previous value reached without bursting.

3. „Biegeradius“ – bend radius
Our specifications are based on a manual measuring at an environment temperature of 20°C. A sample with exact measures of the size in question should be used.

Our examination standard:
The measuring sample is put on graph paper and bend to a semi-circle until the tube's ends are parallel. On a fixed point, the bend radius is reduced until the tube shows a kink or kinks totally. This proofs the previous value to be the minimum bend radius in mm of this size.

We hope above explanations will give an idea about our standards and product quality and will facilitate the use of our data sheets.

May 25th, 2004 RK