



Technical Information

Tightness test of fabric expansion joints with foam building liquid

RAL-GZ 719

TI-005

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The present technical information is based on the DECHEMA Information Bulletin ZfP1 „Leak test procedures for instruments and components for chemical plants“ (available only in German language, named: Informationsblatt ZfP1 „Dichtheitsprüfung an Apparaten und Komponenten von Chemieanlagen“).

1. Scope

The task of the leak test is to verify the tightness. This is contrary to pressure tests which prove sufficient strength versus pressure load.

Leak tests for fabric expansion joints may be carried out during production at a selected test object or during commissioning and acceptance test of the ducting of a plant.

Various procedures for leak tests with different applicability and informative results are common. The Technical information describes the applicable method of leak tests.

2. Principle

The Quality Committee of the Quality Association for Fabric Expansion Joints provides clearly arranged advices for the selection and execution of leak tests for the inspector.

The tightness can be provided by a company, which is entitled to carry the RAL- mark of quality for Fabric Expansion Joints

or

by an independent expert organisation, which is listed at Quality Committee of the Quality Association for Fabric Expansion Joints.

3. Terms and Definitions

3.1. Tightness

The test object is considered to be tight if it is not possible to prove, that the test medium passes through from one test bench to the other respectively from the test bench to the outer atmosphere.

The proof is based on the selected test method and its required test sensitivity respectively the detection sensitivity of the method.

3.2. Leakage (Leak)

The leak is the actual location where it was proved that the medium passes through. The proof is based on the selected test method and its required test sensitivity respectively the detection sensitivity of the method.

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3.3. Leakage rate

The leak rate is the quantity of test medium, which passes through a leak as a result of the pressure difference during a certain time. The leakage rate of one single leak is not an absolute measurement. It depends on the shape (dimension) of the leak and the nature of the test media used for the detection of the leak and the selection of the test conditions.

The common unit of the leakage rate for gases is „millibar times liter per second“ ($\text{mbar}\cdot\text{l}\cdot\text{s}^{-1}$).

One leak with a leakage rate of $1 \text{ mbar}\cdot\text{l}\cdot\text{s}^{-1}$ is existing if the pressure of an evacuated room with a volume of 1 l will increase 1 mbar per second (under constant temperature in the corresponding room).

3.4. Total leakage rate

The total leakage rate is the summation of the leak rates of all single leaks of the test object. It will be determined by integral test method.

3.5. Test medium

Test media are liquid or gaseous media, which can be detected after passing through the leak.

4. Appropriate methods for leak tests

According to the material features of fabric expansion joints the selection of the methods for gas tightness is limited to tests with gaseous media.

For practical tests a detection sensitivity of 10^{-2} to $10^{-4} \cdot \text{mbar}\cdot\text{l}\cdot\text{s}^{-1}$ is sufficient.

According to the detection sensitivity, the bubble method with a foaming liquid is appropriate. The test is carried out under pressure. Reasonable media are air or nitrogen. Nekal[®] or an equal foaming liquid acts as auxiliary material.

For testing, the test section shall be sprinkled with this liquid. Fine bubbles will appear at the leak.

For particular requirements of the tightness, specific test criteria have to be determined.

5. Instructions for testing the tightness with bubble method

5.1. Prearrangement for testing

5.1.1. Cleaning and Drying

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The test object shall be sufficiently free of lubricants, grease and other impurity to grant a correct moistening of the surface. Wet test objects have to be dried.

5.1.2. Sealing of openings

The area to be tested has to be sufficiently sealed gastight to keep a constant test pressure.

For this reason all openings have to be sealed gastight, specifically for tests of duct systems. For leak tests during production suitable test facilities which simulate the installation of the expansion joint shall be provided.

5.1.3. Pressure measurement

The test pressure shall be indicated at a suitable manometer.

5.1.4. Ambient influences

The ambient shall not influence the developing foam. The illumination and the artificial light shall provide a proper contrast.

6. Testing

6.1. Test medium and test auxiliaries

The test media air or nitrogen is discharged into the test room. The test gas shall be dry and mostly free of lubricants. Foaming liquid is acting as test auxiliary for the bubble method (top 3. para 3).

6.2. Pressurization

6.2.1. Pressure

The test is generally performed at a pressure of 5000 Pa. The maximum required test pressure shall not exceed the operating pressure (design pressure).

6.2.2. Vacuum

Tests under vacuum conditions are not suitable.

6.3. Test procedure

The bubble method is a qualitative method which is performed at ambient temperature. It serves for detecting and proving local leaks. Therefore the indication of leakage rates is only subject to specific conditions.

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Measures for an accurate testing:

- bubble free sprinkling of the foaming liquid
- observation of the developing bubbles during moistening of the test section
- Check again the same area after about 10–60 seconds to also detect the slowly growing small foam bubbles on small leaks

6.4. Time of testing

It is recommended to perform the ultimate bubble leak test after final production, cleaning and non-destructive tests.

After having repaired the detected leaks, the test has to be repeated.

6.5. Test report

It is recommended to record the test conditions and the result in a test report.

7. Measures after the test

It is recommended to discharge the pressure. Removal of the foaming liquid is not common practice. In case of rework it is required.

8. Precautions

For the charging of the test room with test gas (air, nitrogen) the valid safety regulations have to be respected.

The maximum test pressure after mathematic analysis of the wall thickness is 10.000 Pa in case the test is carried out at non-pressurized vessels and duct sections.

The protective measures for electrical operated auxiliaries have to be respected at the test location.

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