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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 42155-2023

**Hydraulic fluid power - Spin-on filters method for verifying - The
rated fatigue life and the rated static burst pressure of the
pressure-containing envelope**

液压传动 旋装滤检验方法 承压壳体额定疲劳寿命和额定静态爆破压力

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Foreword

This document was issued on 17 March 2023 by the State Administration for Market Regulation; Standardization Administration of the PRC and takes effect on 1 October 2023.

It is a GB/T standard: recommended rather than compulsory, but it is the text a Chinese reviewer applies when assessing a submission.

1 Scope

GB/T 42155-2023 verifies two ratings of the pressure-containing envelope of a spin-on filter, a filter with a disposable element and a limited life: the rated fatigue life and the rated static burst pressure. Test samples are defined first; a cyclic fatigue test then runs the envelope at its rated fatigue pressure to confirm the claimed life, and an explosion test, carried out on a hydraulic bench that supplies stable and controllable hydrostatic pressure, confirms the static burst pressure. Data expression fixes what the report carries, beginning with the rated fatigue life, the rated fatigue pressure and the number of cycles reached. An analogy method for checking the rated fatigue life, the rated fatigue pressure and the rated static burst pressure follows, and then a clause on consistency between the tested spin-on filter and the production part, so that a figure earned by one housing cannot be carried over to a housing that is no longer the same. Terms come from ISO 5598. A filter body sits in the

pressure line and is loaded and unloaded every time the machine works, so it gives way by fatigue under repeated loading rather than by a single overload, and a rating for one without the other says little. For filter manufacturers, hydraulic system designers, and the test houses that certify them.

This document describes the inspection methods for the rated fatigue life and rated static burst pressure of spin-on filter's pressure-containing envelope, which uses disposable filter elements and has limited life.

Due to the short service life of the spin-on filter housing, the rated fatigue life of 100000 cycles is sufficient for typical industrial applications.

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, for dated reference documents, only the version corresponding to the date applies to this document; for undated reference documents, the latest version (including all amendments) applies to this document.

ISO 5598 Fluid power systems and components - Vocabulary

Note: GB/T 17446-2012 Fluid power systems and components - Vocabulary (ISO 5598:2008, IDT)

ISO/TR 19972-1 Hydraulic fluid power - Methods to assess the reliability of hydraulic components - Part 1: General procedures and calculation method

3 Terms and definitions

The following terms and definitions as defined in ISO 5598 apply to this document.

When more than six spin-on filters fail in the test, the test data of all failed spin-on filters shall be evaluated.

5.5.3 According to the provisions of ISO/TR 19972-1, use Weibull analysis method, to calculate the B10 life N_f at 95% confidence level.

5.6 Inspection

If the calculated rated fatigue life (N_f) exceeds the recommended rated fatigue life

(100000 cycles, unless otherwise specified), the spin-on filter's rated fatigue life and rated fatigue pressure pass the inspection.

6 Explosion test to verify rated static burst pressure

6.1 Test equipment

6.1.1 Hydraulic test bench, which provides stable and controllable hydrostatic pressure.

6.1.2 Test liquid, which is any suitable non-corrosive liquid.

6.1.3 Pressure measuring instrument, which is installed directly or as close as possible to the spin-on filter joint or base; it shall not be installed in the pipeline supplying the test fluid to the spin-on filter under test. Through setting and maintenance, the measurement accuracy is controlled within $\pm 2\%$.

6.1.4 Thermostat, the temperature measurement accuracy of which can be controlled within $\pm 3\text{ }^{\circ}\text{C}$, through setting and maintenance.

6.2 Test conditions

6.2.1 Select the rated static burst pressure to be verified.

6.2.2 Ensure that the temperature of the test fluid in the test equipment is $30\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$.

6.3 Test procedure

6.3.1 Tighten threaded connections to the manufacturer's recommended torque values. Record the installation torque value on the test report.

Warning: Torque, gasket lubrication and other factors have an important impact on the structural test of spin-on filters.

6.3.2 Discharge the air in the test pipeline and the spin-on filter under test.

6.3.3 Ensure that the temperature of the test fluid meets the requirements of 6.2.2. Record the temperature value.

6.3.4 Slowly pressurize the spin-on filter under test. When the pressure reaches 0.5 times the rated static burst pressure, which is selected in 6.2.1, maintain the pressure for 60 seconds.

6.3.5 Continue to pressurize at intervals of 5% or 100 kPa of the rated static burst

pressure value, which is selected in 6.2.1. Maintain the pressure for 60 seconds, after each pressurization.

6.3.6 Continue to increase the pressure, until the failure defined in 6.4 occurs. Record the pressure at the time of failure.

6.3.7 Use at least the test data of six tested spin-on filters in the test group. When there are more than six spin-on filter test failures, the test data for all failures shall be evaluated.

6.4 Failure criteria

If any of the following circumstances occurs, it will be deemed as a failure:

- a) Structural failure;
- b) It is confirmed through magnetic particle or fluorescent penetration technology that cracks are caused by static pressure;
- c) Leakage from seals or sealing surfaces;
- d) Permanent deformation that affects the normal function of the pressure-containing envelope.

6.5 Calculation of rated static burst pressure

6.5.1 Select the test data of at least six tested spin-on filters (see 6.3.7) in the test group.

6.5.2 In accordance with the provisions of ISO/TR 19972-1, use Weibull analysis method, to calculate the rated static burst pressure p_{Br} , at 95% confidence level.

6.6 Inspection

If the calculated lower limit pressure exceeds the recommended rated static burst pressure, the rated static burst pressure passes the inspection.

7 Data expression

7.1 The test report, which is issued in accordance with this document, shall at least include the following contents:

- a) Rated fatigue life N_f , rated fatigue pressure p_{fr} , the number of cycles during the