Prüfbericht-Nr.: *Test Report No.*:	**SHI50100 001**	**Auftrags-Nr.:** *Order No.*:	244425094	Seite 1 von 9 *Page 1 of 9*
Kunden-Referenz-Nr.: *Client Reference No.*:	N/A	**Auftragsdatum:** *Order date*:	May.24, 2022	
Auftraggeber: *Client*:	Changzhou Zhechang Gas Spring Co., Ltd. Industrial Zone, Qianhuang Town, Wujin District, Changzhou City, Jiangsu, P.R. China Email:qc@wdf-gaslift.com, TEL:06-2707563			
Prüfgegenstand: *Test item*:	Tapered pressure tubes for self-supporting gas springs for the height adjustment of seating			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	ZC-A/B-20			
Auftrags-Inhalt: *Order content*:	Initial type test for TÜV-Mark Approval			
Prüfgrundlage: *Test specification*:	EN 16955:2017 Hardware for furniture - Tapered pressure tubes for self-supporting gas springs for the height adjustment of seating - Test methods and requirements for strength and durability			
Wareneingangsdatum: *Date of receipt*:	May.25, 2022			
Prüfmuster-Nr.: *Test sample No.*:	20220525-28			
Prüfzeitraum: *Testing period*:	Mar.14,2012 - Jun.1,2012 Jun.1,2022 - Jun.19,2022			
Ort der Prüfung: *Place of testing*:	Nürnberg, Shanghai			
Prüflaboratorium: *Testing laboratory*:	TÜV Rheinland labs			
Prüfergebnis*: *Test result**:	Pass			

geprüft von / *tested by*:			**kontrolliert von** / *reviewed by*:		
2022.07.19	Jason Gu / Project engineer	Jason	2022.07.19	Steven Lu / Reviewer	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*: 1. Test samples were prepared and sent by client.
2. The test result is copied from initial type test report No. 94605497-01, issued by TÜV Rheinland LGA Bautechnik GmbH.

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Prüfbericht-Nr.: SHI50100 001
Test Report No.:

Liste der verwendeten Prüfmittel
List of used test equipment

Prüfmittel *Test equipment*	**Prüfmittel-Nr. / ID-Nr.** *Equipment No. / ID-No.*	**Nächste Kalibrierung** *Next calibration*
Digital caliper	I05-001	2023.06.29
Durability test machine	I05-SL-001	2022.09.01
Magnetic particle flaw Detector	I05-069	2023.03.10

Prüfbericht-Nr.: SHI50100 001
Test Report No.:

Produktbeschreibung
Product description

1	**Produktdetails** *Product details*	Tapered pressure tubes for self-supporting gas springs for the height adjustment of seating Type: ZC-A/B-20 Material: 20# steel acc. to GB/T 3639-2009 Outside diameter: 28mm Wall thickness: 2.0mm Surface finish: Hard chrome plated
2	**Maße / Gewicht** *Dimensions / Weight*	
3	**Bedienelemente** *Operating elements*	N/A
4	**Ausstattung / Zubehör** *Equipment / Accessories*	N/A
5	**Verwendete Materialien** *Used materials*	20# steel acc. to GB/T 3639-2009
6	**Sonstiges** *Other*	Manufacturer of tubes: Changzhou Zhechang Gas Spring Co., Ltd. Date of production of the pressure tubes: Apr, 2012 & Apr, 2022
Samples before testing		
		

Absatz	**EN 16955:2017**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

1 Scope

This European Standard specifies test methods and requirements for the strength and durability of tapered pressure tubes for self-supporting gas springs for the height adjustment of seating.

Annex A (normative) contains product information.

Annex B (informative) contains a guide for choosing the correct strength class.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 4288, Geometrical product specifications (GPS) - Surface texture: Profile method - Rules and procedures for the assessment of surface texture (ISO 4288)

EN ISO 7500-1:2016, Metallic materials - Verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Verification and calibration of the force-measuring system (ISO 7500-1)

EN ISO 9934-2, Non-destructive testing - Magnetic particle testing - Part 2: Detection media (ISO 9934-2)

ISO 1099, Metallic materials - Fatigue testing - Axial force-controlled method

3 Terms and definitions

Not applicable.

4 Strength classes for pressure tubes

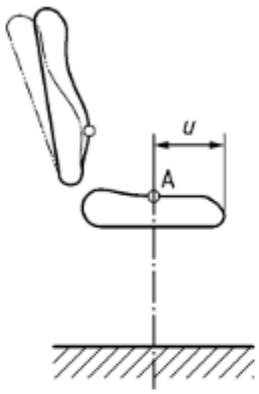
The determination of the strength classes is based on characteristics given in Table 1. The dimension *u* of the seating is given in Figure 1.

Table 1 — Strength classes for pressure tubes

Strength class[a]	Alternate bending moment	Largest distance between load bearing structure of the seat and centre of the column
	M Nm	*u* mm
2	±190	≤ 340
3	±210	≤ 370
4	±240	≤ 400

[a] Due to increased requirements, strength class 1 is not part of this European Standard.

Absatz	EN 16955:2017	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*



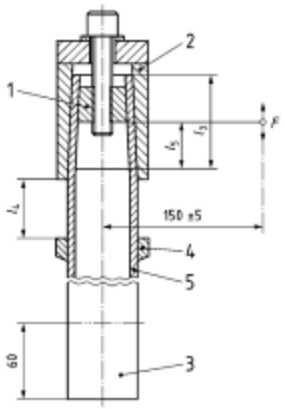
Key
A mid of centre column
u largest distance between load bearing structure of the seat and centre of the column

Figure 1 — Largest distance *u* between load bearing structure of the seat and centre of the column

5	**Test apparatus**		
5.1	**Material testing machine** A material testing machine capable of performing tests in accordance with ISO 1099 shall be used. The testing machine force measuring system shall be verified statically in accordance with EN ISO 7500-1:2016, Class 1.		P ☒ F ☐ N/A ☐ N/T ☐
5. 2	**Testing equipment for magnetic powder flaw test** A testing equipment for magnetic powder flaw test for the particle inspection for the detection of surface imperfections shall be used.		P ☒ F ☐ N/A ☐ N/T ☐
6	**Test**		
6.1	**General** For each combination of dimensions, production procedure, surface finish, materials or condition of the material or any other characteristic, which affects the strength and durability, a separate test shall be conducted.		P ☒ F ☐ N/A ☐ N/T ☐

Absatz *Clause*	**EN 16955:2017** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
6.2	**Strength and durability**		
6.2.1	**Sampling** The test samples shall consist of 32 pressure tubes taken on a random basis from the series production. Any kind of marking on the pressure tube shall be done before strength and durability test.		P ☒ F ☐ N/A ☐ N/T ☐
6.2.2	**Test procedure**		
6.2.2.1	**Test setup** The test setup is shown in Figure 2. The end of the pressure tube shall be firmly fixed to the element which applies the load. If the element which applies the load is secured against coming loose by a counter-cone on the internal side of the pressure tube the free bending length l_5 shall be at least 50 % of the overlap l_3 (see Figure 2). The free length l_4 between the upper and lower clamps shall be at least 50 mm. If there are series-produced shapings, embossings etc. in the area of the bearing length of the pressure tube, these areas shall be included in the tests so that they are in the compression-tension zone. Exceptions to this are pressure tubes with shapings, embossings etc. which are up to 60 mm away from the lower end of the pressure tube.	Dimensions of the test fixture: according to the details supplied by the manufacturer of the pressure tubes Overlap l_3 in test fixture: 30.3mm~31.3mm	P ☒ F ☐ N/A ☐ N/T ☐

Dimensions in millimetres



Key
1 counter-cone
2 element which applies the load
3 shapings and embossings permitted in this area without testing
4 lower clamp
5 pressure tube
l_3 length of connection between the holding cone and the pressure tube cone
l_4 free length between upper and lower clamp
l_5 free bending length
F test load

Tolerances: ± 0,5 mm of the nominal dimensions, unless otherwise stated

Figure 2 — Test setup for strength and durability

Absatz *Clause*	**EN 16955:2017** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
6.2.2.2	**Test procedure** The test shall be performed according to ISO 1099. The alternate bending moment *M* shall be as specified in Table 1. It shall act in parallel to the longitudinal axis of the pressure tube. The length of the lever arm which applies the force is (150 ± 5) mm. The time characteristic of the test force shall be sinusoidal. The stress cycle frequency shall not exceed 30 Hz. The alternate bending stress shall be applied with stress regulation. The temperature of the test piece shall not exceed 50 °C during the test. To determine the strength and durability, the alternate bending stresses shall be applied in 2×10^6 cycles and a mean stress of 0.	Alternate bending moment: ±210 Nm Strength class: 3 Cycle frequency: 5 Hz	P ☒ F ☐ N/A ☐ N/T ☐
6.2.3	**Evaluation and requirement** After the test, the surfaces of the test pieces shall be subjected to a magnetic powder flaw test over their entire length and their entire circumference. The magnetic powder flaw test shall be performed on pressure tubes made of unalloyed and low-alloyed steels with alternating current magnetization. The test areas shall be cleaned and free of interfering impurities. Suitable test apparatus shall be used to ensure that a tangential field strength of at least 2 kA/m is achieved. Wet test media shall be used for the test. The particle size of the magnetic powder shall be according to EN ISO 9934-2. Only carrier liquids which do not cause any corrosion to the subject of the test shall be used. If oil is used as a carrier agent, the sort selected shall be easily removed and leave no interfering residue. Marked test oils are suitable. If water is used as a carrier agent, it can be necessary to use additives to ensure that the surface is properly wet (amount according to manufacturer's instructions). The detection sensibility shall not be impaired by these additives. The test is deemed to have been passed if no cracks or fractures are seen on any of the 32 pressure tubes tested.		P ☒ F ☐ N/A ☐ N/T ☐

Absatz *Clause*	**EN 16955:2017** Anforderungen - Prüfungen / *Requirements - Tests*	Messergebnisse - Bemerkungen *Measuring results - Remarks*	Bewertung *Evaluation*
7	**Test report** Each type test shall be documented in a test report. The test report shall contain at least the following information: — address of testing laboratory; — date of testing; — date of production of the pressure tubes; — full description of the pressure tubes (e.g. type, material, surface finish, dimensions); — manufacturer of the pressure tubes; — dimensions of the test fixture (according to the details supplied by the manufacturer of the pressure tubes); — overlap l_3 in test fixture; — alternate bending moment and the strength class; — cycle frequency; — documentation of the test equipment and the test setup; — condition of the test pieces after the magnetic powder flaw test (fracture, visible crack lengths).	Condition of the test pieces after the magnetic powder flaw test: No fracture or visible crack	P ☒ F ☐ N/A ☐ N/T ☐
8	**Marking of the pressure tube** The following shall be marked indelibly in a clearly visible place on each pressure tube: — manufacturer; — type designation of the manufacturer; — reference to this European Standard and strength class (according to Table 1) (e.g. EN 16955-2).		P ☒ F ☐ N/A ☐ N/T ☐
Annex A Product information (normative) ➔ See details in EN 16955:2017			
Annex B Guide for choosing the correct strength class (informative) ➔ See details in EN 16955:2017			

Absatz	**EN 16955:2017**	Messergebnisse - Bemerkungen	Bewertung
Clause	Anforderungen - Prüfungen / *Requirements - Tests*	*Measuring results - Remarks*	*Evaluation*

Appendix I - Test Date Sheet

Serial sample no.	Serial bearing element no.	Cone angle α	Outside diameter (mm)	Wall thickness (mm)	Load alternation achieved (10^6)	Result of magnetic powder flaw test
1	1	1°26'16"	28.00	2.00	2.00	Pass
	2	1°26'16"	28.00	2.00	2.00	Pass
	3	1°26'16"	28.00	2.00	2.00	Pass
	4	1°26'16"	28.00	2.00	2.00	Pass
	5	1°26'16"	28.00	2.00	2.00	Pass
	6	1°26'16"	28.00	2.00	2.00	Pass
	7	1°26'16"	28.00	2.00	2.00	Pass
	8	1°26'16"	28.00	2.00	2.00	Pass
2	1	1°26'16"	28.00	2.00	2.00	Pass
	2	1°26'16"	28.00	2.00	2.00	Pass
	3	1°26'16"	28.00	2.00	2.00	Pass
	4	1°26'16"	28.00	2.00	2.00	Pass
	5	1°26'16"	28.00	2.00	2.00	Pass
	6	1°26'16"	28.00	2.00	2.00	Pass
	7	1°26'16"	28.00	2.00	2.00	Pass
	8	1°26'16"	28.00	2.00	2.00	Pass
3	1	1°26'16"	28.00	2.00	2.00	Pass
	2	1°26'16"	28.00	2.00	2.00	Pass
	3	1°26'16"	28.00	2.00	2.00	Pass
	4	1°26'16"	28.00	2.00	2.00	Pass
	5	1°26'16"	28.00	2.00	2.00	Pass
	6	1°26'16"	28.00	2.00	2.00	Pass
	7	1°26'16"	28.00	2.00	2.00	Pass
	8	1°26'16"	28.00	2.00	2.00	Pass
4	1	1°26'16"	28.00	2.00	2.00	Pass
	2	1°26'16"	28.00	2.00	2.00	Pass
	3	1°26'16"	28.00	2.00	2.00	Pass
	4	1°26'16"	28.00	2.00	2.00	Pass
	5	1°26'16"	28.00	2.00	2.00	Pass
	6	1°26'16"	28.00	2.00	2.00	Pass
	7	1°26'16"	28.00	2.00	2.00	Pass
	8	1°26'16"	28.00	2.00	2.00	Pass

---------- End of Report ----------