



Test Report

No.: GZHL2007038409LD

Date: Sep 04, 2020

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YONGKANG AOYI INDUSTRIAL AND TRADING CO., LTD
LONGSHAN INDUSTRIAL BASE, YONGKANG CITY, ZHEJIANG, CHINA

Sample Description : MLUTI-PURPOSE LADDER
Style / Item No. : AY-403

As above test item and its relevant information regarding to the submission are provided and confirmed by the applicant. SGS is not liable to either the test item or its relevant information, in terms of the accuracy, suitability, reliability or/and integrity accordingly.

Sample Receiving Date : Jul 20, 2020
Test Performing Date : Jul 20, 2020 to Sep 03, 2020
Test Performed : Selected test(s) as requested by applicant
Test Result(s) :

Table with 2 columns: Test Requested, Result. Row 1: EN 131-4:2020+AC:2020, Pass

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Handwritten signature of Arthur Mak



Arthur Mak
Authorized Signatory



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SGS-CSTC Standards Technical Services Co., Ltd.
Guangzhou Branch Testing Center Hotlines

198 Kezhu Road, Sciencetech Park Guangzhou Economic & Technology Development District, Guangzhou, China 510663 t (86-20) 82155555 f (86-20) 82075191 www.sgs.com.cn
中国·广州·经济技术开发区科学城科珠路198号 邮编: 510663 t (86-20) 82155555 f (86-20) 82075191 e sgs.china@sgs.com

Test Conducted: Based on EN 131-4:2020+AC:2020 ladders- Single or multiple hinge-joint ladders

1. Scope:

This document specifies the requirements, tests and marking of hinged combination ladders with one or several hinge joints.

This document is not applicable to hinge-joints of combination and standing ladders as defined by EN 131-1.

This part of the standard is intended to be used in conjunction with EN 131-1, EN 131-2 and EN 131-3.

2. Ladder Type: Ladder with several lockable hinged joint device

3. Client claim maximum permissible load: 150 Kg

4. Grade of ladder: Non-professional

5. Number of tested sample: 2 Pieces

6. Test Results: Details shown as following table

Table 1 Functional dimensions

Test Item	Test Method	Test Result
Leaning rung ladders	EN 131-1:2015 Clause 4.2	Pass
Standing rung ladders	EN 131-1: 2015 Clause 4.3	Pass
Combination ladders	EN 131-1: 2015 Clause 4.4	NA
Leaning step ladders	EN 131-1: 2015 Clause 4.5	NA
Standing step ladders	EN 131-1: 2015 Clause 4.6	NA
Hinged ladders in "platform" position	EN 131-4:2020 Clause 4.2	Pass
Hinged ladders in "stand-off" position	EN 131-4:2020 Clause 4.3	Pass



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Table 2: Requirements of BS EN / NF EN / EN 131-4:2020 Clause 5:

Test Item	Test Method	Test Principle & Requirements	Test Result
General	BS EN / NF EN / EN 131-4:2020 Clause 5.1	The requirements are based upon a maximum total load of 150 kg. Hinge-joint ladders are determined to be used by one person at a time.	Pass
Decking component	BS EN / NF EN / EN 131-4:2020 Clause 5.2	If the multiple hinge ladder can be used in a platform position, the decking component shall be delivered with the product. The decking component shall be secured against unintentional movement and shall have a durable slip resistant working surface. It shall be designed so as to be unable to slip and tilt on the ladder.	Pass
Ladder hinged in the longitudinal direction	BS EN / NF EN / EN 131-4:2020 Clause 5.3	All hinges should be locked in the position of use except for the centre hinge in the standing ladder position, which may be unlocked. The storage position (folded) is not required to be lockable.	Pass

Table 3: Requirements of BS EN / NF EN / EN 131-4:2020 Clause 6:

Test Item	Test Method	Test Principle & Requirements	Test Result
General	BS EN / NF EN / EN 131-4:2020 Clause 6.1	General provisions, see EN 131-2. After each of the tests specified in Annex A, the ladder shall remain functional with no fracture or visible cracks. The ladders shall sustain the load without ultimate failure. Permanent deformation is permitted. After the test, fold the ladder completely to its storage/transportation position and open it again completely. During this movement the locking system shall function without any interference. After the test, the hinges/locking systems shall remain functional in all positions.	Pass
Strength test for ladders with hinges in longitudinal direction	BS EN / NF EN / EN 131-4:2020 Clause 6.2.2	Ladders tested according to 6.2.2 and 6.2.3 shall fulfil: — the locking mechanism shall work correctly; — the ladder shall remain upright and not break; — permanent deformation is only acceptable providing the ladder remains fully functional and it does not impair the fitness for use, or safety, of the ladder.	Pass
Additional strength test for ladders with more than one pair of hinges in longitudinal Direction	BS EN / NF EN / EN 131-4:2020 Clause 6.2.3		Pass
Cyclic test of hinge joint	BS EN / NF EN / EN 131-4:2020 Clause 6.2.4	Requirement: Automatic locking function shall operate with no manual intervention for a duration of 4 000 cycles.	Pass
Strength test of the decking component	BS EN / NF EN / EN 131-4:2020 Clause 6.2.5.2	Deformation under load shall be less than or equal to 1 % of the decking component(s) length or width. Residual deformation shall be less than or equal to 0,1 % of the decking component(s) length or width.	Pass



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Test Item	Test Method	Test Principle & Requirements	Test Result
		Where there are more than one decking components and they vary in design or in the way they are supported, then repeat the test on each decking component.	
Strength test of the ladder and decking components	BS EN / NF EN / EN 131-4:2020 Clause 6.2.5.3	Apply the test load, distributed over the steel plate, for a period of 1 min. Remove the load and examine the ladder and the decking components for compliance with 6.1.	Pass
Stability test of the ladders in the platform position	BS EN / NF EN / EN 131-4:2020 Clause 6.2.5.4	With the test force applied, the ladder shall not overturn.	Pass
Test of decking component sliding	BS EN / NF EN / EN 131-4:2020 Clause 6.2.5.5	When examined for movement, the decking component shall: a) not have moved more than 5 mm in relation to the origins for measurement; b) continue to meet the dimensional requirements for decking components specified in 4.2.	Pass
Cyclic test of hinge joints for lateral hinge ladders	BS EN / NF EN / EN 131-4:2020 Clause 6.2.6	All the ladders with hinge joints shall be subjected to a series of folding and unfolding operations allowing the resistance of the hinge joints to be tested. A series of 4 000 cycles from working positions to storage position shall be carried out at the normal utilization speed. No oil shall be added during the tests.	NA
Capacity to pass from storage positions to working position in lateral direction	BS EN / NF EN / EN 131-4:2020 Clause 6.2.7	Requirements No rupturing of parts shall be observed. If the ladder is equipped with an automatic locking system, it shall be locked and unlocked in each of its extreme positions during the course of each cycle. In this case, the automatic locking function shall operate at the end of the test.	NA



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Table 4 Marking and User instruction Requirements:

Test Item	Test Method	Test Principle & Requirements	Test Result
Marking	BS EN / NF EN / EN 131-4:2020 Clause 7	Ladders shall meet the marking requirements of EN 131-3. Marking shall comply with the requirements for durability according to EN 131-2.	Pass
User Instruction	BS EN / NF EN / EN 131-4:2020 Clause 8	User instruction in accordance with EN 131-3 shall be provided. For hinge ladders according to Clause 3, the following information shall be stated in the user manual or on the ladder. When the hinge ladder is used as access equipment for a higher level, the ladder has to be secured against unintentional sideways sliding.	Pass

Annex A

Test Item	Test Method	Test Principle & Requirements	Test Result
Strength test of stiles	EN 131-2:2010+A2:2017 Clause 5.2	Requirements: The ladder shall remain functional with no fracture or visible cracks. The ladder shall sustain the load without ultimate failure. Permanent deformation shall be allowed.	Pass
Bending test of the stiles	EN 131-2:2010+A2:2017 Clause 5.3	Thereby the maximum permissible deflection f_{max} . as a function of the distance l between the supports shall be: — $f_{max} = 5 \times l^2 \times 10^{-6}$ mm for ladders of length less than or equal to 5 m; — $f_{max} = 0,043 \times l - 90$ mm for ladders of length more than 5 m and less than or equal to 12 m; — $f_{max} = 0,06 \times l - 294$ mm for ladders of length more than 12 m.	Pass
Lateral deflection test of the ladder	EN 131-2:2010+A2:2017 Clause 5.4	Thereby the maximum permissible deflection f_{max} as a function of the distance l between the supports shall be $f_{max} = 0,005 l$, in millimetres	Pass
Bottom stile ends test	EN 131-2:2010+A2:2017 Clause 5.5	Requirement: The permanent deflection f in each test shall not exceed 2 mm. Neither fracture nor visible cracks are allowed.	NA
Vertical load on rungs, steps and platforms	EN 131-2:2010+A2:2017 Clause 5.6	The maximum permanent deformation after removal of the test-load shall be less than or equal to 0,5 % of the inner width b_1 (see EN 131-1), measured underneath the tested step.	Pass
Torsion test of rungs and steps	EN 131-2:2010+A2:2017 Clause 5.7	After the test a permanent deformation shall be 1° at maximum with a tolerance of $\pm 0,2^\circ$.	Pass
Test of opening restraints and hinges of	EN 131-2:2010+A2:2017 Clause 5.8	After removal of the test loads of the tests according to 5.8.2 to 5.8.4 no visible permanent deformation shall occur on the hinge joints, opening restraint devices and their	Pass



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Test Item	Test Method	Test Principle & Requirements	Test Result
standing ladders		attachments. The ladder shall not show any visible damages such as cracks, indentations, etc. Permanent deformation is acceptable only if it does not impair the fitness for use of the ladder.	
Test for ladder rung/step hooks of extending ladders and combination ladders	EN 131-2:2010+A2:2017 Clause 5.9	After removal of the test load, there shall be no permanent deformation which impairs the fitness for use of the ladder.	NA
Kick-up test of the platform of standing ladders	EN 131-2:2010+A2:2017 Clause 5.10	The platform shall not lift from its stop by more than 6°.	NA
Feet pull test	EN 131-2:2010+A2:2017 Clause 5.11	After the test, the foot shall remain functional and show a movement from its original position of less than or equal to 4 mm.	Pass
Test on hand-/kneerails	EN 131-2:2010+A2:2017 Clause 5.12	The distance between the stile and the handrail during the test shall not be less than 15 mm.	NA
Torsion on ladder length	EN 131-2:2010+A2:2017 Clause 5.15	Requirement: The front stile of the ladders that is not clamped to the floor shall not move more than 25 mm from its datum position whilst the horizontal load is applied.	Pass
Durability test for standing ladders	EN 131-2:2010+A2:2017 Clause 5.17	The load application shall continue until the defined load value is no longer maintained by the thrust device or until to the collapse of standing ladder or until the defined number of cycles for each class has been achieved. The maximum number of cycles is registered.	Pass
Base slip test for leaning ladder	EN 131-2:2010+A2:2017 Clause 5.18	The ladder feet shall not move outwards more than 40 mm with respect to the origin for measurement.	Pass
Strength test for lateral type stabilizers on leaning ladders which are in the plane of the ladder	EN 131-2:2010+A2:2017 Clause 5.19	After removal of the test load the ladder, stabilizers and their connections shall remain functional with no fracture or visible cracks.	NA
Strength test for pole type stabilizers on leaning ladders which are not in the plane of the ladder	EN 131-2:2010+A2:2017 Clause 5.20	After removal of the test load the ladder, stabilizers and their connections shall remain functional with no fracture or visible cracks.	NA



Test Item	Test Method	Test Principle & Requirements	Test Result
Torsion test for leaning ladder	EN 131-2:2010+A2:2017 Clause 5.21	When tested in accordance with 5.21.1, the difference between the deflections of the two stiles shall meet the following equation: $f1 - f2 \leq 0,07bu$	Pass
Materials	EN 131-2-2010+A2-2017 Clause 4.2	Aluminium-alloy, steel, plastic or wood was required.	Pass (See Test Result 1)

Remark: 1. NA = Not applicable.

Test Result 1: (SGS Ref. No.: GZIN2008040682ML)

Tensile Test:

Test Method: EN ISO 6892-1:2019

Test item	Specimen type	Elongation after fracture, A_{50mm} (%)
Result-Leg	Rectangular specimen	11.0
Result-Beam	Rectangular specimen	17.0

Sample Photo(s):

Sample as received



End of Report



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