

Test conclusion

Product Designation	Protection device for agricultural excavator	Type	50
Design Organization	Shandong Rippa Machinery Group Co., Ltd.	Trademark	——
Name of Manufacturer	Shandong Rippa Machinery Group Co., Ltd.	Date of Manufacture	September 30, 2020
		Factory Number	50.46.01
Entrustment Company	Shandong Rippa Machinery Group Co., Ltd.	Sample Number	1
Type of test	Performance Test	Date of test	October 16, 2020
Reference Standards	(See Annex B)	Testing Items	1、 TOPS lateral load energy test; 2、 Low temperature performance test of materials
Test Conclusion	According to GB/T 19930-2005 standard, the prototype of model 50 tumble protective device (TOPS) with the maximum mass of 2800kg Agricultural excavator was tested, the test object has reached the GB/T 19930-2005 requirements. Date of Issued: 2020-10-29		
Note	Type 50 roll protection device is suitable for R330 and R350 agricultural excavators.		

Approver:

Verifier:

Manager:

Summary of test results

No.	Test Item	Unit	Criteria	Test Result	Conclusion
1	TOPS lateral load energy test	J	2648	When the lateral loading force is 34.3kN, the energy 2671J, the TOPS component or the simulated ground plane are not invaded by DLV.	Passed
2	Low temperature performance test of materials	J	5.5	25	Passed

※The specimen size is 10mm×2.5mm,the temperature of specimen is -30℃.

Annex A Test sample

A1 Sample Appearance



Figure A1 sample appearance

A2 Specification of sample

The TOPS is produced and designed by Shandong Rippa Machinery Group Co., Ltd.. It is suitable for the Shandong Rippa Machinery Group Co., Ltd. R350 Agricultural excavator. The sample is in a normal state before test.

A3 List of main identification

machine	Type	Agricultural excavator
	Manufacturer	Shandong Rippa Machinery Group Co., Ltd.
	Model number	R350
	Serial number	—
	Machine frame part number	—
	machine of maximum weight	2800 kg
TOPS	Manufacturer	Shandong Rippa Machinery Group Co., Ltd.
	Model	50
	Number	50.46.01
	Protective device number	—

Annex B Test standards

—	Technology Agreement
GB/T 19930-2005	Earth-moving machinery- Tip-Over Protection Structure(TOPS) for compact Hydraulic Excavators- Laboratory tests and performance requirements

Annex C Test condition

C1 Ambient temperature during performance test

Test date	Temperature, °C	Humidity, %
October 16, 2020	15	36

C2 Main test equipment

No.	Test equipment	Type	Serial No.	Accuracy	Next calibration date
1	General strength testing system for construction machinery	RTF1000-117	ZJ6-041	±1%	April 2, 2021

C3 Test site

Test items	Test site
TOPS lateral load energy test	Vehicle Testing Engineering Research Institute of China
Low temperature performance test of materials	

Annex D Test results

D1 Check results of sample before test

Table D1

Check items		Check results
Machine	Type	Agricultural excavator
	Manufacturer	Shandong Rippa Machinery Group Co., Ltd.
	Model number	R350
	Serial number	—
	Machine frame part number	—
TOPS	Manufacturer	Shandong Rippa Machinery Group Co., Ltd.
	Model	50
	Number	50.46.01
	Protective device number	—

D2 Description of Deflection-limiting Volume (DLV)

According to ISO 3164:2013, we have fixed DLV, see figure D1. The location of DLV in the TOPS, see figure D2.



Figure D1 Deflection-limiting Volume

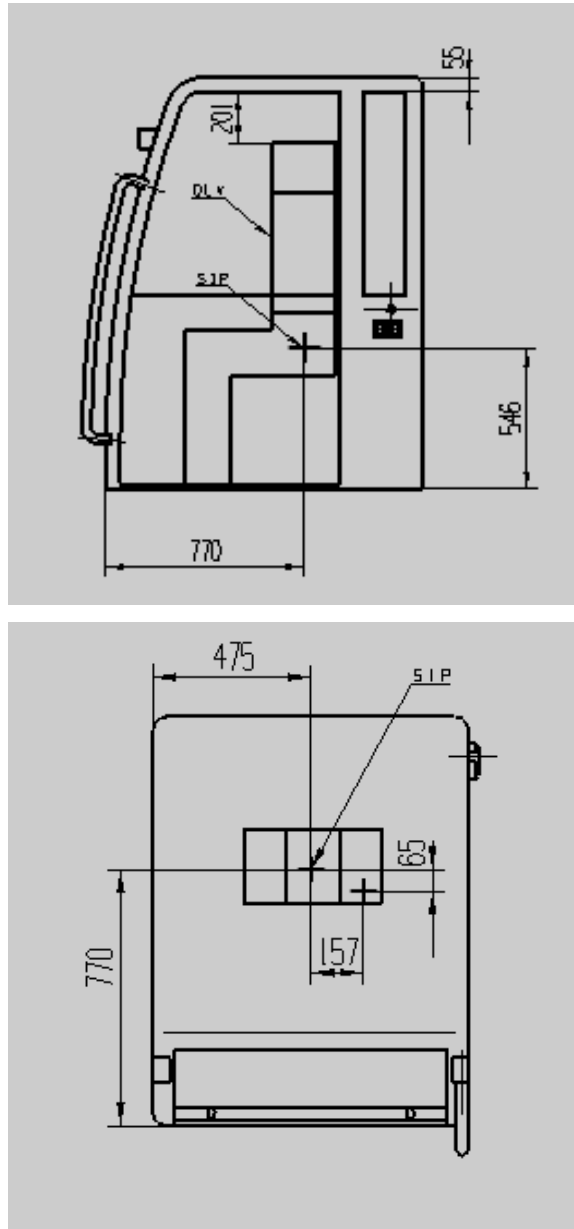


Figure D2 The location of DLV

D3 Detection index

$$\text{TOPS lateral load energy } U = 13000 \left(\frac{M}{10000} \right)^{1.25} = 2648 \text{ J}$$

Note: manufacturer recommended maximum weight of M=2800kg

D4 TOPS lateral load energy test

The state of Lateral load see appendix Figure F1, the end of Lateral load see appendix Figure F2, Load force ,displacement and energy data and the curves are shown in Table D2 and the curves of Force-displacement and Force-energy are shown in Figure.D3, Figure.D4.

Table D2 lateral load test data of Tip-over protection structure

Number	Force, kN	displacement, mm	Energy, J
1	0.0	0	0
2	4.0	5	12
3	6.1	10	34
4	8.3	15	71
5	10.5	19	115
6	12.8	24	166
7	15.3	29	236
8	17.6	34	314
9	19.8	39	422
10	21.8	44	531
11	23.8	49	650
12	25.6	55	769
13	27.4	60	898
14	28.9	65	1055
15	30.1	71	1224
16	30.8	76	1400
17	30.5	82	1567
18	31.5	87	1721
19	32.3	93	1920
20	33.0	99	2096
21	33.4	104	2289
22	34.0	110	2485
23	34.3	115	2671

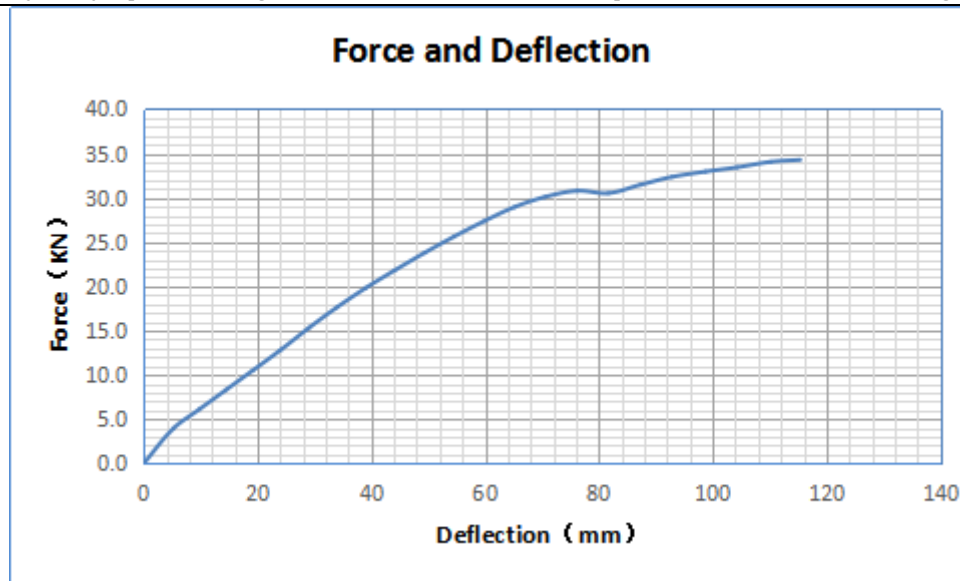


Figure D3 Force-Deflection curve of lateral load test

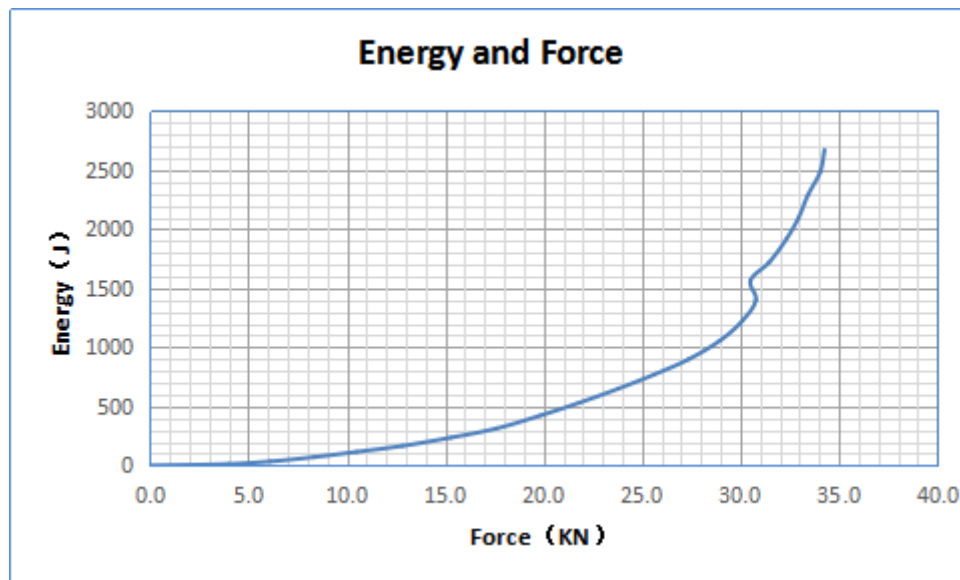


Figure D4 Force-energy curve of lateral load test

The maximum lateral load force is 34.3kN and maximum lateral load energy is 2671J. After testing, the lateral displacement of Tip-over protection structure's components is 115mm. The deformation of any part of TOPS or the simulated ground plane did not invade the DLV.

D5 Low temperature performance test of materials

TOPS metal structures specimens temperature is -30 °C. The materials, specimen sizes and the low temperature performance test of materials' results shown in Table D3

Table D3 Results of materials' low temperature performance test

Material	Specimen size	Criteria (J)	Impacting Energy(J)
Q235	10mm ×2.5mm	≥11	25

Bolt property class: M12×1.0 M16×1.5 10.9 Class

Nut property class: M12; M16 10 Class

Annex E Tester and participants

Vehicle Testing Engineering Research Institute of China:

Wang Haofeng Yang Mingkai

Annex F Test pictures



Figure. F1 Before the lateral loading test



Figure. F2 After the lateral loading test

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CNAS L0138

No.: GGJ06.2020.MY34.02.4547

Test Report

Product Name: Protection device for agricultural excavator

Product Type : 50

Entrusted unit: Shandong Rippa Machinery Group Co., Ltd.

Type of Test : Performance Test

Vehicle Testing Engineering Research Institute of China

China National Construction Machinery Quality Supervising Test Centre

Oct. 2020



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