

Test conclusion

Product Designation	Protection device for agricultural excavator	Type	28
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	28.45.01
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 28 tumble protective device (TOPS) with the maximum mass of 1400kg Agricultural excavator was tested, the test object has reached the GB/T 19930-2005 requirements. Date of Issued: 2020-10-29		
Note	Type 28 roll protection device is suitable for R328,NDI316and R327agricultural excavators.		

Approver:

Verifier:

Manager:

Summary of test results

No.	Test Item	Unit	Criteria	Test Result	Conclusion
1	TOPS lateral load energy test	J	1113	When the lateral loading force is 22.0kN, the energy 1132J, 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. R328 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	R328、NDI316、R327
	Serial number	——
	Machine frame part number	——
	machine of maximum weight	1400 kg
TOPS	Manufacturer	Shandong Rippa Machinery Group Co., Ltd.
	Model	28
	Number	28.45.01
	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	R328、NDI316、R327
	Serial number	——
	Machine frame part number	——
TOPS	Manufacturer	Shandong Rippa Machinery Group Co., Ltd.
	Model	28
	Number	28.45.01
	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

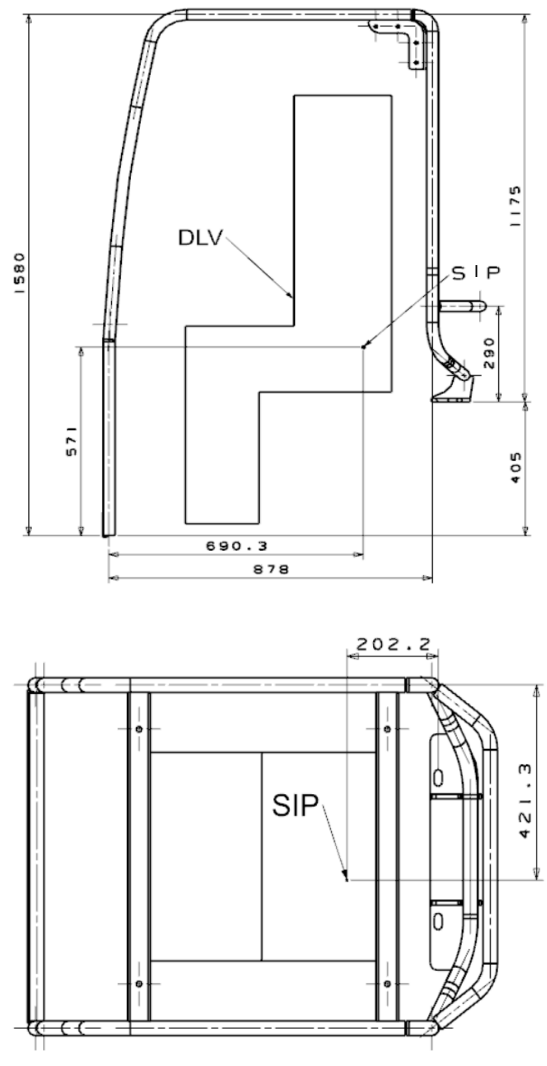


Figure D2 The location of DLV

D3 Detection index

$$\text{TOPS lateral load energy } U = 13000 \left(\frac{M}{10000} \right)^{1.25} = 1113 \text{ J}$$

Note: manufacturer recommended maximum weight of $M=1400\text{kg}$

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	1.9	4	3
3	3.2	7	11
4	4.5	11	22
5	5.7	14	34
6	7.3	17	60
7	9.0	21	89
8	10.5	24	113
9	12.2	28	162
10	13.8	31	201
11	15.3	35	245
12	16.6	38	313
13	17.6	42	370
14	18.5	45	434
15	19.2	49	505
16	19.8	53	587
17	20.3	57	648
18	20.7	60	719
19	21.1	64	815
20	21.4	68	884
21	21.7	72	976
22	22.0	76	1057
23	22.0	79	1132

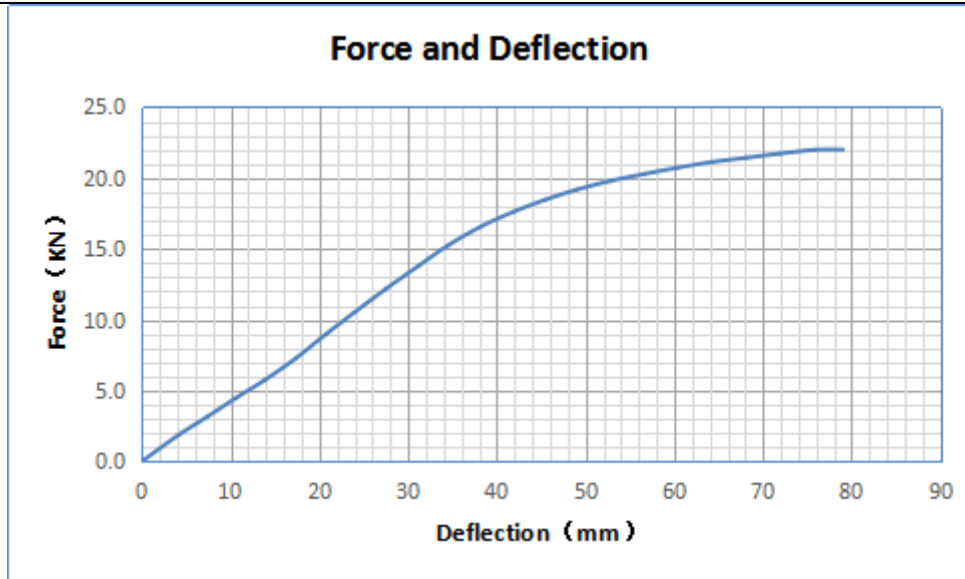


Figure D3 Force-Deflection curve of lateral load test

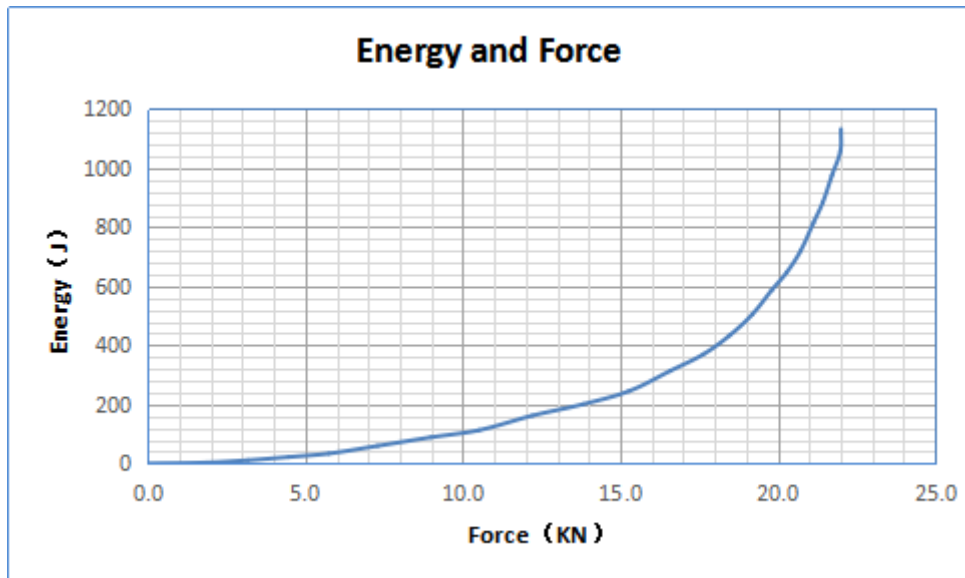


Figure D4 Force-energy curve of lateral load test

The maximum lateral load force is 22.0kN and maximum lateral load energy is 1132J. After testing, the lateral displacement of Tip-over protection structure's components is 79mm. 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)
20#	10mm ×2.5mm	≥ 11	25

Bolt property class: M8×1.0; M10×1.0 8.8 Class

Nut property class: M8; M10 8 Class

Annex E Tester and participants

Vehicle Testing Engineering Research Institute of China:

Wang Haofeng Yang Mingkai

Annex F Test pictures

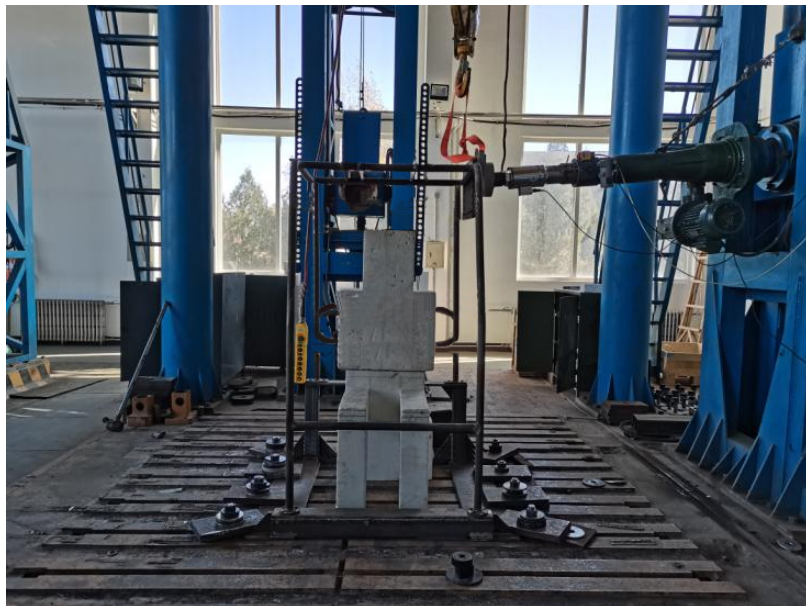


Figure. F1 Before the lateral loading test



Figure. F2 After the lateral loading test

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TESTING
CNAS L0138

No.: GGJ06.2020.MY34.02.4546

Test Report

Product Name: Protection device for agricultural excavator

Product Type : 28

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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