

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ No.: COMB-214/2482/2020

माह/Month: July, 2020

THIS TEST REPORT VALID UP TO : 31st JULY, 2027



**VISHAL 435 BRISK PLUS
SELF PROPELLED COMBINE HARVESTER**



भारत सरकार

Government of India

कृषि एवं किसान कल्याण मंत्रालय

Ministry of Agriculture and Farmers Welfare

कृषि, सहकारिता एवं किसान कल्याण विभाग

Department of Agriculture, Cooperation and Farmers Welfare

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

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14. FIELD TEST

14.1 Combine harvester was operated in field for 27.58 and 27.15 hours for wheat and paddy harvesting respectively. During the test, available varieties of crop were harvested to assess the field performance of combine with regard to quality of work, rate of work, fuel consumption, safety and soundness of construction etc. The crop and atmospheric conditions during field test are given in Appendix - II & IV respectively.

The crop parameters recorded during the test for all crops are as under:-

Crop Parameters

Sl. No.	Parameters		Observations	
			Wheat	Paddy
1.	Average plant height, cm	:	63 to 102	89 to 108
2.	Average number of tillers/m ²	:	264 to 569	198 to 262
3.	Average length of ear head, cm	:	7 to 12	21 to 30
4.	Average straw/grain ratio	:	1.0 to 1.56	1.6 to 3.0
5.	Average moisture, %			
	- Grain	:	10.0 to 11.5	14.8 to 15.2
	- Straw	:	9.6 to 11.7	61.9 to 63.8

The results of field performance test of wheat and paddy crops harvesting are summarised in Table - 5 and presented in detail in Appendix - II to V.

Table- 5 : SUMMARY OF LOSSES & EFFICIENCIES OBSERVED DURING FIELD PERFORMANCE TEST.

Crop variety	Collectable losses (%) (Max.)	Non-collectable losses (%) (Max.)	Total processing losses (%) (Max.)	Threshing efficiency (%) (Min.)	Cleaning efficiency (%) (Min.)	Grain breakage in main grain tank (Max.) (%)	Forward speed (kmph)	Area covered (ha/h)	Fuel consumption		Grain output (kg/h)	Crop throughput (t/h)
									(l/h)	(l/ha)		
1	2	3	4	5	6	7	8	9	10	11	12	13
WHEAT												
HD 2967	2.3	2.3	2.8	99.4	97.6	1.81	1.71 to 2.21	0.629 to 0.825	6.19 to 7.42	8.98 to 11.71	2603.54 to 3824.13	6.01 to 8.29
PADDY												
PUSA 1129	2.2	0.09	2.5	99.0	97.0	1.26	1.44 to 1.59	0.416 to 0.475	6.55 to 7.85	13.78 to 18.86	1934.04 to 2501.14	5.84 to 8.59

14.2 Unloading of grains

The time to unload the grain tank ranged from 54 to 74 second in Wheat operation & 55 to 60 seconds in Paddy operation.



14.3 Time required for daily maintenance

The average labour required for daily maintenance was approximately two man hours.

14.4 Harvesting of any other crop

Not done , as not recommended

15. DEFECTS, ADJUSTMENTS, BREAKDOWNS AND REPAIRS

Straw walker drive idler sprocket pin was broke during paddy harvesting

16. INSPECTION AND ASSESSMENT OF WEAR

The engine and other assemblies were dismantled after 89.85 hours of engine operation.							
16.1 Engine							
16.1.1 Cylinder bore							
Cylinder No.	Cylinder bore dia. (mm)						Max. permissible wear limit (mm)
	Top position		Middle position		Bottom position		
	Thrust side	Non-thrust side	Thrust side	Non-thrust side	Thrust side	Non-thrust side	
1.	104.01	104.00	104.01	104.00	104.00	104.00	104.15
2.	104.00	104.00	104.00	104.00	104.00	104.01	
3.	104.00	104.00	104.00	104.00	104.00	104.00	
4.	104.00	104.00	104.01	104.00	104.00	104.00	
5.	104.00	104.00	104.00	104.00	104.00	104.00	
6.	104.01	104.00	104.01	104.00	104.00	104.00	

16.1.2 Piston

Piston No.	Piston dia. (mm)				Clearance between cylinder liner and piston (mm)	
	Top position		At skirt		Observed	Discard limit
	Thrust side	Non-thrust side	Thrust side	Non-thrust side		
1.	103.30	103.19	103.96	Not measured due to piston design constraint	0.08	0.2
2.	103.31	103.16	103.92			
3.	103.30	103.17	103.95			
4.	103.28	103.16	103.92			
5.	103.29	103.15	103.92			
6.	103.30	103.13	103.93			



16.1.3 Ring end gap

Cylinder No.	Ring end gap (mm)									Max. Permissible wear limit (mm)
	1st Compression Ring			2nd Compression Ring			Oil Ring			
	Top	Middle	Bottom	Top	Middle	Bottom	Top	Middle	Bottom	
1.	0.40	0.40	0.45	0.50	0.50	0.50	0.40	0.35	0.35	1.2
2.	0.35	0.35	0.40	0.50	0.50	0.50	0.35	0.30	0.30	
3.	0.40	0.35	0.35	0.50	0.45	0.45	0.30	0.30	0.35	
4.	0.45	0.40	0.40	0.50	0.50	0.50	0.30	0.30	0.30	
5.	0.40	0.40	0.35	0.50	0.45	0.45	0.35	0.35	0.35	
6.	0.45	0.40	0.40	0.45	0.45	0.45	0.35	0.35	0.30	

16.1.4 Ring side clearance

Rings	Ring side clearance (mm)						Max. Permissible wear limit, mm
	Piston 1	Piston 2	Piston 3	Piston 4	Piston 5	Piston 6	
1 st Comp. Ring	Taper ring						
2 nd Comp. Ring	0.07	0.08	0.06	0.08	0.08	0.09	0.20
Oil ring	0.03	0.04	0.05	0.03	0.03	0.04	0.20

16.1.5 Main and big end bearings**16.1.5.1 Main bearings**

Bearing No.	Diametrical clearance (mm)	Crank shaft end float (mm)	Permissible wear limit (mm)	
			Diametrical clearance	Crank shaft end float
1	0.13	0.15	0.25	0.60
2	0.12			
3	0.12			
4	0.12			
5	0.13			
6	0.13			
7	0.10			

16.1.5.2 Big end bearings

Bearing No.	Clearance(mm)		Permissible wear limit (mm)	
	Diametrical	Axial	Diametrical	Axial
1	0.07	0.40	0.25	0.60
2	0.06	0.45		
3	0.08	0.45		
4	0.06	0.40		
5	0.10	0.45		
6	0.07	0.45		



16.1.6	Valves and valve guides	Observation	
	Any marked sign of overheating of valves	:	None
	Pitting of seat/faces of valves	:	None
	Spring stiffness, N/mm (kgf/mm)		
	Inlet valve spring	:	20.44 to 22.06 (2.08 to 2.25)
	Exhaust valve spring	:	21.95 to 22.61 (2.24 to 2.30)
	Clearance between valve guide and valve stem(mm):	Observations	Discard limit
	- Inlet valve	:	0.06 to 0.10
	- Exhaust valve	:	0.08 to 0.12
			Not Specified

16.2 Steering system

Visual condition of the components of complete steering assembly : No noticeable defect observed.

16.3 Chains, sprockets and belts

Visual condition of the components of complete assembly : No noticeable defect observed.

16.4 Bearings

Visual condition of the components of complete assembly : No noticeable defect observed.

16.5 Wear of rasp bar

Sr. No.	Mass of rasp bar before test (g)	Mass of rasp bar after 27.58 h test (g)	Wear (%) by weight
1	5502.7	5470.6	0.78
2	5451.3	5418.0	0.61
3	5389.8	5357.6	0.60
4	5374.5	5343.0	0.59

16.6 Wear of the peg teeth

The wear of the peg teeth of the threshing cylinder and concave was measured. The percentage wear on mass basis was computed and the results are given below:

Sl. No.	Original mass before test (g)	Mass after 27.15 h of test (g)	Percent wear by weight (%)
a)	Peg teeth of threshing cylinder		
1.	225.6	224.4	0.53
2.	223.0	221.8	0.54
3.	222.7	221.5	0.54
4.	219.4	218.2	0.55
5.	221.4	219.9	0.68
6.	213.7	212.4	0.61
7.	220.0	218.5	0.46
8.	221.7	220.2	0.68
9.	216.6	215.0	0.74
10.	213.4	212.0	0.66

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11.	224.2	222.8	0.62
12.	216.0	214.8	0.56
13.	216.0	214.9	0.51
14.	219.8	218.6	0.55
15.	217.9	216.7	0.55
16.	221.5	220.5	0.45
b)	Peg teeth of concave		
1	220.1	219.2	0.54
2	227.9	226.5	0.61
3	218.3	217.0	0.60
4	228.8	227.5	0.57
5	226.3	225.3	0.44
6.	236.1	234.8	0.55

17. SUMMARY OF OBSERVATIONS

17.1 ENGINE PERFORMANCE TEST

Table-1 : ENGINE PERFORMANCE TEST (NATURAL AMBIENT)

Brake Power kW	Engine speed (rpm)	Fuel consumption			Specific energy, kWh/l
		l/h	kg/h	Specific, kg/ kWh	
(1)	(2)	(3)	(4)	(5)	(6)
a) Maximum power – 2 hours test					
73.8	2299	21.87	18.05	0.245	3.37
68.8	1549	18.30	15.17	0.220	3.76*
b) Power at rated engine speed: (2200 rpm)					
73.1	2199	21.87	18.04	0.247	3.34

*High idle at no load was 1650 rpm recommended for field operation.

Table-2 : ENGINE TEST (HIGH AMBIENT)

Brake power (kW)	Engine speed (rpm)	Fuel consumption			Specific energy, kWh/l
		l/h	kg/h	Specific, kg/kWh	
(1)	(2)	(3)	(4)	(5)	(6)
a) Maximum power -					
71.6	2299	21.92	17.93	0.250	3.27
b) Power at rated engine speed (2200 rpm)					
71.2	2199	21.61	17.82	0.247	3.31



17.2 Field test**17.2.1 Summary of field tests**

The results of the field test are summarized below:-

S. No	Parameters	Observed range	
		Wheat harvesting	Paddy harvesting
1.	Range of average speed of operation (kmph)	1.71 to 2.21	1.44 to 1.59
2.	Range of average area covered (ha/h)	0.629 to 0.825	0.416 to 0.475
3.	Maximum average fuel consumption: - (l/h) - (l/ha)	6.19 to 7.42 8.98 to 11.71	6.55 to 7.85 13.78 to 18.86
4.	Range of average crop throughput (tonne/h)	6.01 to 8.29	5.84 to 8.59
5.	Reported average grain breakage in main grain outlet (%)	1.81	1.26
6.	Reported average header losses (%)	1.71	0.60
7.	Reported average total non-collectable losses (%)	2.30	0.9
8.	Reported average total collectable losses (%) (un threshed + broken from main outlet)	2.30	2.2
9.	Reported average total processing losses (%)	2.80	2.5
10.	Reported average threshing efficiency (%)	99.4	99.0
11.	Reported average cleaning efficiency (%)	97.6	97.0

17.3 Conformity to Indian Standard

- | | | |
|-------|--|--------------------------|
| (i) | IS: 6025-1982 (Reaffirmed 2014)-Specification for knife section for harvesting machine. | Does not conform in toto |
| (ii) | IS: 6024-1983 (Reaffirmed 2014)-Specification for guards for harvesting machines. | Does not conform in toto |
| (iii) | IS: 10378-1982 (Reaffirmed 2016)-Specification of knife back for harvesting machine. | Does not conform in toto |
| (iv) | IS: 6283 (Part I & Part II)-2007(Reaffirmed 2014)- Tractors and machinery for agriculture and forestry- symbol for operator controls and other displays. | Does not conform in toto |
| (v) | IS: 8133-1983 (Reaffirmed 2014)-Guidelines for location & operation of operator controls on agricultural tractors and machinery. | Does not conform in toto |
| (vi) | IS: 15806-2018 (Combine Harvester recommendation on selected performance and other characteristics | Does not conform in toto |



19. COMMENTS AND RECOMMENDATIONS	
19.1	Mechanical vibration The amplitude of mechanical vibration of components marked as (*) in chapter 12 of this report are observed on higher side. This calls for providing suitable remedial measures to dampen the vibration in order to improve the operational comfort and service life of various components & sub-assemblies.
19.2	Provision for varying oscillation of sieve is not provided. It MUST be provided.
19.3	There is no drive safety for grain unloading auger. It should be provided
19.4	Safety against the accidental start of engine is not provided on combine harvester. It MUST be provided.
19.5	The clearance between engine inlet valve and valve guide the discard limit is not specified. It MUST be specified.
19.6	Field performance test No noticeable defect observed during field test.
19.7	Ease of operation and safety provision
	i) Slip clutch at crop auger is not provided. It MUST be provided as per the requirement of IS 15806 : 2018
	ii) It is recommended that the symbols as per the requirement of IS: 6823 (Part 1) 2006 and IS: 6823 (Part 2) 2007 MUST be provided.
	iii) The first aid box is not provided on machine. It MUST be provided.
	iv) Slow Moving Vehicle Emblem is not provided. It MUST be provided.
19.8	Hardness and chemical composition Hardness & chemical composition of knife blade, knife guard and knife back is not within the limits specified in their respective IS: 6025-1982. It should be looked into for corrective action at regular production level.
19.9	Straw walker drive sprocket pin was broke. It should be looked into.



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