व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT

संख्या/ **No.: COMB-205/2360/2019**
माह/**Month: September, 2019**

THIS TEST REPORT VALID UP TO : 30th September, 2026

MAHINDRA H 12 2WD HARVEST MASTER TRACTOR OPERATED COMBINE HARVESTER

सत्यमेव जयते

भारत सरकार
Government of India
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Ministry of Agriculture and Farmers Welfare
कृषि, सहकारिता एवं किसान कल्याण विभाग
Department of Agriculture, Cooperation and Farmers Welfare
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b)	Peg teeth of concave		
1	208.3	207.2	0.53
2	217.0	215.9	0.51
3	212.6	211.1	0.71
4	215.1	214.3	0.37
5	217.8	216.3	0.69
6	219.3	218.3	0.46

18. SUMMARY OF OBSERVATIONS

18.1 Tractor P.T.O. Performance Test: (Refer tractor test report No T-938/1456/2014, October 2014 issued by C.F.M.T & T.I Budni)

18.2 Field test

18.2.1 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)	2.62 to 2.73	2.22 to 2.32
2.	Range of average area covered (ha/h)	0.644 to 0.741	0.492 to 0.607
3.	Maximum average fuel consumption: - (l/h) - (l/ha)	 5.33 8.28	 6.69 12.88
4.	Range of average crop throughput (tonne/h)	5.65 to 8.19	7.13 to 8.51
5.	Reported average grain breakage in main grain outlet (%)	2.00	0.87
6.	Reported average header losses (%)	1.68	0.13
7.	Reported average total non-collectable losses (%)	1.9	0.50
8.	Reported average total collectable losses (%) (un threshed + broken from main outlet)	2.2	1.1
9.	Reported average total processing losses (%)	2.9	1.6
10.	Reported average threshing efficiency (%)	99.3	99.5
11.	Reported average cleaning efficiency (%)	96.8	98.1
	Performance of straw chopper cum spreader		
12.	Average percent of coefficient of variation for uniformity of spreading %	--	19.8
13.	Average weighted chop size - cm	--	10.2

18.3 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 II)-2007(Reaffirmed 2014)-Tractors and machinery for agriculture and forestry-symbol for operator controls and other displays. : Conforms

(v) IS: 8133-1983 (Reaffirmed 2014)-Guidelines for location & operation of operator controls on agricultural tractors and machinery. : Conforms

vi) IS: 15806:2018 Recommendation on selected performance and other characteristics **Does not conform in toto**

19. SELECTED PERFORMANCE AND OTHER CHARACTERISTICS AS PER IS 15806 : 2018

S. No	Characteristics		Category (Evaluative/ Non evaluative)	Requirement /Declaration	Tolerance	Observed	Remarks
1	2		3	4	5	6	7
I.	**Prime mover performance**						
	a)	Max. Power (absolute) Average max. Power observed during 2 hrs. Max. Power test in natural ambient condition, kW	Evaluative	37.51	±5% of declared value	36.5	Conforms
	b)	Max. Power observed during test after adjusting the no load engine speed as per recommendation of the manufacturer for field work, kW	Evaluative	--	±5% of declared value	--	--
	c)	Power at rated engine speed, kW (under natural ambient condition)	Evaluative	37.51	±5% of declared value	36.4	Conforms
	d)	Specific fuel consumption corresponding to average maximum power under 2h maximum power test, g/kWh.	Evaluative	251	+5% of declared value	248	Conforms
	e)	Max. Smoke density at 80% load between the speed at max. Power & 55% of speed at max. Or 1000 rpm whichever is higher	Evaluative	As pre CMV rules. Maximum smoke density Light absorption coefficient 3.25 per meter /Hartridge units 75	Nil	0.29	Conforms

1	2		3	4	5	6	7
	f)	Max. Crank shaft torque, (Nm) observed during the test after no load engine speed is adjusted as per manufacture's recommendation for field work	Evaluative	Not applicable	--	Not applicable	--
	g)	Back up torque, %	Evaluative	7 % min.	Nil	24.7	--
	h)	Max. Operating temperature, 0C i) Engine oil ii) Coolant	Evaluative	 130 112	Should not exceeds the declared value	 124 102	Conforms
	i)	Lubrication oil consumption, g/kWh	Evaluative	Not exceeding 1 % of SFC at maximum power (high ambient)	Nil	0.39	Conforms
II. Brake performance at 24 km/h or maximum speed whichever is less							
	a)	Max. Stopping distance at a force equal to or less than 600 N on brake pedal (m)- (cold brake and hot brake)	Evaluative	As per requirement of CMVR	--	Cold 6.50 Hot 7.40	Conforms
	b)	Max. Force exerted on brake pedal to achieve declaration of 2.5 m/sec^2 (N)	Evaluative	≤ 600N	--	Cold 127 Hot 145	Conforms
	c)	Effectiveness of parking brake at a force of 600 N at foot pedal or 400 N at hand lever	Evaluative	As per requirement of CMVR	--	Effective	Conforms
III. Mechanical vibration							
	a)	Operator's platform	Non evaluative	120 µm max.	Nil	2200	**Does not conform**
	b)	Steering control wheel	Non evaluative	150 µm max.	Nil	3600	**Does not conform**
	c)	Seat with driver seated	Non evaluative	120 µm max.	Nil	3200	**Does not conform**
IV. Air cleaner oil pull over							
	a)	Air cleaner oil pull over in % when tested in accordance with IS 8122 part (II) 2000	Evaluative	0.20 max.	Nil	Dry type air cleaner provided hence test is not applicable	--

1	2		3	4	5	6	7
V. Noise measurement							
	a)	Max. ambient noise emitted by combine at by slanders position dB (A)	Evaluative	88 dB (A) as per CMVR	Nil	86	Conforms
	b)	Max. noise at operator's ear level dB (A)	Evaluative	98 dB (A) as per CMVR	Nil	95	Conforms
VI. Header lifting Test							
	a)	Satisfactory completion of header lifting test	Evaluative	-	Nil	Satisfactory completed	Conforms
VII. Discard limit							
	a)	Cylinder bore diameter, mm	Evaluative	--	Should not exceed the values declared by the manufacture	Not applicable as tractor mounted combine Harvester	--
	b)	Piston diameter, mm	Evaluative	--	-do-	-do-	--
	c)	Piston to cylinder liner clearance at skirt	Evaluative	--	-do-	-do-	--
	d)	Ring end gap, mm i) Top compression ring ii) 2nd compression ring iii) Oil ring	Evaluative	--	-do-	-do-	--
	e)	Ring groove clearance, mm 1. Top compression ring 2. 2nd compression ring 3. Oil ring	Evaluative	--	-do-	-do-	--
	f)	Diametrical and axial clearance of big end bearing, mm Diametrical Axial	Evaluative	--	-do-	Not applicable as Tractor mounted Combine Harvester	--
	g)	Diametrical and axial clearance of main bearings, mm Diametrical Axial/crank shaft end float	Evaluative	--	-do-	-do-	--

	h)	Thickness of brake lining, mm	Evaluative	--	-do-	-do-	--	
	i)	Thickness of clutch plate, mm	Evaluative	--	-do-	-do-	--	

VIII. Field performance								
	a)	Suitability for crops	Evaluative	Wheat & paddy (Wheel type) Paddy (Track type)		Nil	Wheat and paddy	Conforms
	b)	Average processing losses (%)	Evaluative	Wheat Barley Rice Sorgum Maize Oilseed, rape Soya Beans	: : : : : : :	Max 3% Max 4% Max 4% Max 3% Max 5% Max 4% Max 5%	Nil	Wheat (max) 2.9% Rice (max) 1.6 %	Conforms Conforms
	c)	Threshing efficiency	Evaluative	≥98 percent for wheat & Paddy		Nil	99.3% for Wheat 99.5% for Paddy	Conforms
	d)	Cleaning efficiency	Evaluative	≥96 percent for wheat & Paddy		Nil	96.8% for Wheat 98.1% for Paddy	Conforms
	e)	Grain breakage in main grain tank	Evaluative	≤ 2.5 percent		Nil	2.0% for Wheat 0.87% for Paddy	Conforms
	f)	Non collectable losses	Evaluative	$i) \leq 2.5$ percent for wheat & Paddy & grain $ii) \leq 4.0$ percent for Soybean		Nil	1.9 % For Wheat 0.50 % For Paddy	Conforms

IX	Field performance for straw management system (if fitted)								
	a)	Uniformity of straw spread, C.V. (percent)	Evaluative			20, Max	--	19.8	Conforms
	b)	Weighted mean size of chopped straw , cm	Evaluative			20, Max	--	10.2	Conforms

X. Safety requirement							
	a)	Guards against all moving parts	Evaluative	Belt and chain drives, pulleys hydraulic pipes around operators work place	--	Provided	Conforms
	b)	Lighting arrangement	Evaluative	As per CMVR	-	Provided	Conforms
	c)	Grain tank cover	Evaluative	Essential	-	Provided	Conforms
	d)	Spark arrester in engine's exhaust in case naturally aspirated engine	Evaluative	Essential	-	Provided	Conforms
	e)	Stone trap before concave bars	Evaluative	Essential	-	Provided	Conforms
	f)	Rear view mirror	Evaluative	Essential	-	Provided	Conforms
	g)	Fire extinguisher	Evaluative	Essential	-	Provided	Conforms
	h)	Slip clutch at following drives – i) Cutting platform auger ii)Undershot conveyor drive iii) Grain & tailing elevator	Evaluative Non evaluative Non evaluative	Essential Essential Essential	-	Provided **Not provided** **Not provided**	Conforms **Does not conform** **Does not conform**
	i)	Anti slip surfaces at operator platform & ladder & proper gripping for the control levers.	Evaluative	Essential	-	Provided	Conforms
	j)	Working clearance around the controls	Non evaluative	Essential 70mm,min	-	Provided	Conforms
	k)	Labelling of control and gauges	Evaluative	Essential	-	Provided	Conforms

XI	**Material of construction :**						
	i)	Knife guard should conforms to IS: 6024 - 1983	Non evaluative	Should have maximum hardness 163 HB	-	Hardness 226 HB	**Does not conform**
	ii)	Knife blade As per IS :6025 -1982	Non evaluative	It must have Chemical composition as C=0.70-0.95 % Mn= 0.30-0.50%	-	C= 0.7135 Mn= 0.9862	Conforms **Does not conform**
	iii)	Knife back should meet the requirement of IS:10378-1982	Non evaluative	The knife back shall be manufactured from Carbon Steel having minimum carbon content of 0.35 %	--	C=0.1322	**Does not conform**
	iv)	Material of blades for straw management System (SMS)	Non evaluative	The flail and fixed blades shall be manufactured from steel having the following chemical composition or such other composition as shall be agreed to between the supplier and the purchaser. a) Carbon 0.70 to 1.0 percent. b) Manganese 0.6 to 0.97 percent.	--	Flail blade C=0.9333 Mn=0.8957 Cr=0.1602 Ni=1.6492 Fixed blade C=0.8508 Mn=0.8695	--

				c) Chrome 0.1 percent. d) Nickel 0.1 percent		Cr=0.1616 Ni=1.6285	
	v)	Bushes for flail blades	Non evaluative	Mild steel	-	Mild steel	Conforms
	vi)	Hardness of flail blades for Straw management system (SMS)	Evaluative	Bush section 20 to 35 HRC Edge section (Hardened zone) : 48 to 58 HRC Remainder zone : 20 to 35 HRC	-	14.3 to 16.7 11.4 to 14.5 11.4 to 14.5	**Does not conform** **Does not conform** **Does not conform**
	vii)	Hardness of serrated blades for Straw Management System (SMS) :	Evaluative	Bush section 20 to 35 HRC Edge section (Hardened zone) : 48 to 58 HRC Remainder zone : 20 to 35 HRC	-	12.1 to 14.4 13.6 to 14.9 13.6 to 14.9	**Does not conform** **Does not conform** **Does not conform**
	viii)	**Safety Requirements for Straw Management system, (if Fitted) :**					
		a) Guards against all moving parts/ drives and hot parts	Evaluative	Essential		Provided	Conforms
		b) RPM indicator for rotor	Evaluative	Essential		Provided	Conforms
		c) Overlapping of flail and fixed serrated blades	Evaluative	Essential		Provided	Conforms

XII. Break down (critical, major & minor)

Sr. No.	Category of breakdowns	Category (Evaluative/ Non evaluative)	Requirements as per OM	As observed	Whether meets the requirements (Yes/No)
1.	Critical	Evaluative	No critical breakdown	None	Yes
2.	Major	Evaluative	Not more than two and neither of them should be repetitive in nature	None	Yes

3.	Minor	Evaluative	Not more than five and frequency of each should not be more than two	None	Yes
4.	Total breakdown	Evaluative	In no case total no of (major + minor) breakdowns exceed five	None	Yes

20. COMMENTS AND RECOMMENDATIONS

20.1 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.

20.2 Field performance test

No noticeable defect observed during field test.

20.3 Ease of operation and safety provision

i) No noticeable difficulties observed during operation of combine harvester.

ii) Slip clutches at undershot conveyer drive , grain & tailing elevator drive, is not provided. It **MUST** be provided as per the requirement of IS 15806 : 2018

iii) The first aid box is not provided on machine. It may be provided.

iv) The slip clutch for unloading auger drive , is not provided. It **MUST** be provided

20.4 Cutter bar knife drive safety arrangement is not provided. It should be provided.

20.5 There is no provision for varying oscillation of sieve. It should be looked into.

20.6 There is no provision for varying blower speed. It should be provided.

20.7 Hardness and chemical composition

i) 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.

ii) The harness of fixed & flail blade of SMS does not conforms to the requirement of IS 15806:2018. It MUST be looked into as it is evaluative requirement

20.8 Literature supplied with the machine

The following literature was provided by the applicant during test

i) Operator's cum service manual for combine harvester

ii) Parts catalogue of combine harvester

The operator manual of combine harvester should be updated as per IS 8132-1999

TESTING AUTHORITY

R. K. NEMA SENIOR AGRICULTURAL ENGINEER	
P. K. PANDEY **DIRECTOR**	

Draft test report compiled by Sh.V.S. Shinde STA

21. APPLICANT'S COMMENTS

Para No	Our reference	Applicant's comments
21.1	20.1, 20.3(ii) (iii),20.4,20.5,20.6 and 20.7(i)	We will take necessary corrective action in future production.