व्यावसायिक परीक्षण रिपोर्ट

COMMERCIAL TEST REPORT

संख्या/ **No.: Comb-282/2923/2022**

माह/**Month: October, 2022**

THIS TEST REPORT VALID UP TO : 31st October, 2029

BALKAR B-546, SELF PROPELLED COMBINE HARVESTER

सत्यमेव जयते

भारत सरकार

Government of India

कृषि एवं किसान कल्याण मंत्रालय

Ministry of Agriculture and Farmers Welfare

कृषि एवं किसान कल्याण विभाग

Department of Agriculture and Farmers Welfare

उत्तरी क्षेत्र कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

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19. SELECTED PERFORMANCE AND OTHER CHARACTERISTICS

Sr. 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	73.8	±5% of declared value	73.8	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	68.8	±5% of declared value	68.8	Conforms
	c)	Power at rated engine speed, kW (under natural ambient condition)	Non-evaluative	73.1	±5% of declared value	73.1	Conforms
	d)	Specific fuel consumption corresponding to average maximum power under 2 h maximum power test, g/kWh.	Evaluative	238	+5% of declared value	238	Conforms
	e)	Max. smoke density (Bosch no.) at 80% load between the speed at max. power & 55% of speed at max. power or 1000 rpm whichever is higher	Evaluative	As per CMV rules, Light absorption coefficient is 3.25 m^{-1}/ Hartridge units 75	Nil	2.18 m^{-1}	Conforms
	f)	Max. crank shaft torque, (Nm) observed during the test after no load engine speed is adjusted as per manufacturer's recommendation for field work	Evaluative	429.2	±8% of declared value	429.2	Conforms

	g)	Back up torque, %	Evaluative	7 % min.	Nil	19.6	Conforms
	h)	Max. operating temperature, °C i) Engine oil ii) Coolant	Evaluative	 i) 120 ii) 105	Should not exceed the declared value	 i) 93.6 ii) 87.1	Conforms
	i)	Lubrication oil consumption, g/kWh	Evaluative	Not exceeding 1 % of SFC at maximum power (high ambient)	Nil	0.387	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) **CMVR does not prescribe hot brake test.**	Evaluative	As per requirement of CMVR, Max. 10 m	--	6.17	Conforms
	b)	Max. Force excert on brake pedal to achieve deceleration of 2.5 m/sec^2 (N)	Evaluative	≤ 600 N	--	380	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, Should be effective	--	Effective	Conforms
III. Mechanical vibration							
	a)	Operator's platform	Non evaluative	120 µm max.	Nil	248	**Does not conform**
	b)	Steering control wheel	Non evaluative	150 µm max.	Nil	231	**Does not conform**
	c)	Seat with driver seated	Non evaluative	120 µm max.	Nil	227	**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 is cleaner provided and hence test is not applicable	Not applicable

V. Noise measurement							
	a)	Max. Ambient noise emitted by combine at by standers position dB (A)	Evaluative	As per CMV rules 88 dB (A) Maximum	Nil	85.5	Conforms
	b)	Max. Noise at operator's ear level dB (A)	Evaluative	As per CMV rules 98 dB (A) Maximum	Nil	94.7	Conforms
VI. Header lifting Test							
	a)	Satisfactory completion of header lifting test	Evaluative	-	Nil	Satisfactorily completed	Conforms
VII. Discard limit							
	a)	Cylinder bore diameter, mm	Evaluative	104.15	Should not exceed the values declared by the manufacturer	104.08	Conforms
	b)	Piston diameter, mm	Evaluative	103.826	-do-	103.62	Conforms
	c)	Piston to cylinder liner clearance at skirt	Evaluative	0.10	-do-	0.07	Conforms
	d)	Ring end gap, mm i) Top compression ring ii) 2nd compression ring iii) Oil ring	Evaluative	 i) 1.2 ii) 1.2 iii) 1.2	-do-	 i) 0.45 ii) 0.45 iii) 0.45	Conforms
	e)	Ring groove clearance, mm 1. Top compression ring 2. 2nd compression ring 3. Oil ring	Evaluative	 i) Tapered ii) 0.07 ii) 0.70	-do-	 i)Tapered ii) 0.07 ii) 0.06	Conforms
	f)	Diametrical and axial clearance of big end bearing, mm Diametrical Axial	Evaluative	 0.12 0.60	-do-	 0.08 0.40	Conforms
	g)	Diametrical and axial clearance of main bearings, mm Diametrical Crank shaft end float	Evaluative	 0.13 0.40	-do-	 0.07 0.20	Conforms

	h)	Thickness of brake lining, mm	Evaluative	Up to rivet	-do-	7.90	Conforms
	i)	Thickness of clutch plate, mm	Evaluative	Up to rivet head	-do-	2.40 to 2.45 mm above the rivet head	Conforms
VIII. Field performance							
	a)	Suitability for crops	Evaluative	Wheat and paddy (Wheel type) Paddy (Track type)	Nil	Wheat and paddy	Conforms
	b)	Average processing losses (%)	Evaluative Wheat Rice	 Max (of average) 3% Max (of average) 4%	Nil	 Wheat (max.) 1.8 % Rice (max.) 2.1 %	 Conforms Conforms
	c)	Threshing efficiency	Evaluative	≥98 percent for wheat & Paddy	Nil	98.9 % for Wheat 98.8 % for Paddy	Conforms
	d)	Cleaning efficiency	Evaluative	≥96 percent for wheat & Paddy	Nil	97.4% for Wheat 97.3 % for Paddy	Conforms
	e)	Grain breakage in main grain tank	Evaluative	≤ 2.5 percent	Nil	0.72 % for Wheat 1.07 % 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	0.7 % For Wheat 0.5 % For Paddy	Conforms
IX. Safety requirement							
	a)	Guards against all moving parts/ drives and hot 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 Optional Optional	-	 Provided Provided Provided	 Conforms Conforms Conforms
	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 70 mm, min	-	Provided	Conforms
	k)	Labelling of control and gauges	Evaluative	Essential	-	Provided	Conforms
X	**Material of construction** :						
	i)	Knife guard should conforms to IS: 6024 -1983	Non evaluative	Should have maximum hardness 163 HB	-	223 (Average)	**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=0.49 Mn= 0.44	**Does not conform** Conforms

	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=0.17	**Does not conform**

XI. 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. CRITICAL TECHNICAL SPECIFICATIONS
(Vide Ministry's communication F. No 9-1/2019 M&T (I&P) dated 20.08.2019)

Sr. No.	Parameters	Specification	Observation	Remarks
Rotor				
1.	Rotor diameter, mm	165-170	165	Conforms
2.	No. of lugs on rotor in row	6	5, 6	Conforms
3.	No. of rows in periphery	4	4	Conforms
4.	Length of pivotal flail, mm	170-180	180	Conforms
5.	Width of flail, mm	50 ± 1	50	Conforms
6.	Thickness of flail, mm	5.0 (Min.)	4.2	**Does not conform**
7.	No. of flails in one set	2	2	Conforms
8.	Spacing between flails of one set, mm	35 (Max.)	40	**Does not conform**
9.	Distance between adjacent flails units, mm	200±10	200	Conforms
10.	No. of rows/bars of serrated blades	1	1	Conforms
11.	No. of serrated blades in row	20 (Min.)	22	Conforms
12.	Spacing between serrated blades, mm	50 (Max.)	46.7	**Does not conform**
13.	Overlapping of pivotal blade on serrated blade, mm	60 (Min.)	110 (Adjustable)	Conforms

Spreader				
14.	Total no. of flaps	6 + 2 (side)	6+2	Conforms
15.	Length of flaps, cm	38 (Min.)	34.5	Conforms
16.	Distance between flaps (left to right)	Adjustable	Adjustable	Conforms
17.	Spreader angle with horizontal, degree	Adjustable preferably downwards	Adjustable	Conforms
18.	Spreader angle with line of travel, degree	15 (Min.) (adjustable)	24 (Max.) (Adjustable)	Conforms
19.	Spreader sheet thickness, mm	2.5-3.0	3.0	Conforms
20.	SMS sheet thickness, mm	5.0 (Min.) for outer	6.0	Conforms
21.	Rotor balancing	Should be dynamically balanced	Balanced	Conforms
22.	Rotor rpm	Min. 1600	1665	Conforms
23.	Fitting of SMS on combine harvester	Rigidly fixed to the combine chassis	Rigidly fixed	Conforms
24.	Fitting of power transmission system on combine harvester	Rigidly fixed to the combine chassis	Rigidly fixed	Conforms
25.	Marking/labelling of machine	Labelling plate should be riveted on the body of machine having Name and address of manufacturer, Country of origin, Make and Model, Year of manufacture, Serial number, Type, Size required, size of prime mover (kW), Weight of the machine (kg)	Provided	Conforms
26.	Literature	Operator manual, Service manual and Parts catalogue should be provided	Provided	Conforms

21. COMMENTS AND RECOMMENDATIONS

21.1 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.

21.2 Field performance test

No noticeable defect was observed during field test.

21.3 Ease of operation and safety provision

i) Safety against the accidental start of engine is not provided on combine harvester.

It **MUST** be provided.

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

4 **Hardness and chemical composition**

Hardness & chemical composition of knife blade, knife guard and knife back is not within the limits specified in the relevant standards. It should be looked into for corrective action at regular production level.

5 Individual brake pedals for LHS & RHS brake is not provided. It may be considered for providing.

6 **Literature supplied with the machine**

The following literature was submitted by applicant during testing.

i) Operator's manual for combine harvester
ii) Operator's manual for engine
iii) Parts catalogue for combine harvester

However, the same need to be updated as per IS:8132-1999

TESTING AUTHORITY

Er. SANJAY KUMAR AGRICULTURAL ENGINEER	
Dr. MUKESH JAIN **DIRECTOR**	31.10.2022

The test report is compiled by Er. Ajay

22. APPLICANT'S COMMENTS

No specific comments received from the applicant.