व्यावसायिक परीक्षण रिपोर्ट

COMMERCIAL TEST REPORT

संख्या/ **No.: COMB-186/2168/2018**

माह/**Month : June, 2018**

SELF PROPELLED COMBINE HARVESTER (TRACK TYPE) PREET-949 AF

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

Northern Region Farm Machinery Training and Testing Institute

ट्रैक्टर नगर, सिरसा रोड, हिसार, (हरियाणा) - 125 001

Tractor Nagar, Sirsa Road, HISAR (Haryana)-125 001

[ISO 9001:2015 CERTIFIED]

Website: http://nrfmtti.gov.in/

E-mail: fmti-nr@nic.in

Tele./FAX: 01662-276984

16.7 Bearings

Visual condition of components of combine : No noticeable defect observed

16.8 Wear of the peg teeth bar of threshing cylinder

The wear of the peg teeth bar of the threshing cylinder 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 50.13 hrs. of test (g)	Percent wear by weight (%)
1.	5581.0	5552.6	0.51
2.	5570.6	5556.5	0.25
3.	5532.0	5518.6	0.24
4.	5586.5	5561.6	0.45
5.	5514.8	5492.9	0.40
6.	5597.2	5573.2	0.43

17 SUMMARY OF OBSERVATIONS

17.1 Engine Performance Test:

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)
i) Maximum power – Two hour test:					
59.7	2000	17.84	14.75	0.247	3.35
ii) Power at rated engine speed: (2200 rpm)					
58.2	2200	17.16	14.21	0.244	3.39

Table2- : 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-					
58.3	2000	17.88	14.63	0.251	3.26
b) Power at rated engine speed: (2200 rpm)					
57.3	2199	15.87	13.00	0.277	3.61

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 Paddy harvesting
1.	Average speed of operation (kmph)	1.81 to 2.68
2.	Average area covered (ha/h)	0.200 to 0.378
3.	Average fuel consumption: - (l/h) - (l/ha)	 6.10 to 7.39 19.14 to 33.17
4.	Average crop throughput (tonne/h)	3.87 to 8.49
5.	Average grain breakage in main grain outlet (%)	0.0 to 0.07
6.	Average header losses (%)	0.08 to 0.22
7.	Average total non-collectable losses (%)	0.3 to 1.3
8.	Average total collectable losses (%) (un threshed + broken from main outlet)	0.3 to 1.8
9.	Rubbish/foreign matter in the grain tank (excluding weed and other seed material (%)	0.3 to 1.4
10.	Average total processing losses (%)	1.2 to 3.0
11.	Average threshing efficiency (%)	98.2 to 99.7
12	Average cleaning efficiency (%)	97.3 to 99.3

17.3 Conformity to Indian Standard

(i) IS: 6025-1982 (Reaffirmed 2014)-Specification for knife section for harvesting machine. : **Does not conform**

(ii) IS: 6024-1983 (Reaffirmed 2014)-Specification for guards for harvesting machines. : **Does not conform**

(iii) IS: 10378-1982 (Reaffirmed 2016)-Specification of knife back for harvesting machine. : **Does not conform**

(iv) IS: 6283 (Part-I)-2006 & IS: 6283 (Part-II) (Reaffirmed 2014)-Tractor and machinery for agriculture and forestry, powered lawn and garden equipment-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**

18. SELECTED PERFORMANCE AND OTHER CHARACTERISTICS AS PER OM.

S. No	Characteristics		Category (Evaluative/ Non evaluative)	Requirement /Declaration	Tolerance	Observed	Remarks
1.	**Prime mover performance**						
	a)	Max. Power (absolute) Average max. power observed during 2 hrs. max. power test in natural ambient condition, kW	Evaluative	58.0	±5% of declared value	59.7	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	58.0	±5% of declared value	59.7	Conforms
	c)	Power at rated engine speed, kW (under natural ambient condition)	Evaluative	58.0	±5% of declared value	58.2	Conforms
	d)	Specific fuel consumption corresponding to average maximum power under 2h maximum power test, g/kWh.	Evaluative	238.5	±5% of declared value	247	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	0.616 m^{-1}	Conforms
	f)	Max. crank shaft torque, (N–m) observed during the test after no load engine speed is adjusted as per manufacture's recommendation for field work	Evaluative	305	±8% of declared value	333.3	**Does not conform**
	g)	Back up torque, %	Evaluative	7 percent, Min.	Nil	16.95	Conforms

	h)	Max. Operating temperature, ^{0}C i) Engine oil ii) Coolant	Evaluative	 120 110	Should not exceeds the declared value	 117 113	 Conforms **Does not conform**
	i)	Lubrication oil consumption, g/kWh	Evaluative	Not exceeding 1 % of SFC at maximum power (high ambient)	Nil	0.121	Conforms
2. Brake performance							
	i)	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	--	Not applicable as Hydro static transmissi on does not require any separate/re gular/conv entional brake system.	NA
	ii)	Effectiveness of parking brake at a force of 600 N at foot pedal or 400 N at hand lever.	Evaluative	--	--		NA
3. Mechanical vibration							
	i)	Operator's platform	Non evaluative	120 µm max.	Nil	480	**Does not conforms**
	ii)	Steering control wheel/lever	Non evaluative	150 µm max.	Nil	No steering control wheel is there.	NA
	iii)	Seat with driver seated	Non evaluative	120 µm max.	Nil	773	**Does not conforms**
4. Air cleaner oil pull over							
	i)	Max. oil pull over in % age when tested in accordance with IS: 8122 pt. (II)-2000	Evaluative	0.20% max.	Nil	Dry type air cleaner provided hence test is not applicable	NA

5. Noise measurement							
	i)	Max. ambient noise emitted by combine at bystanders position dB (A)	Evaluative	88 dB (A) as per CMVR	Nil	84.9	Conforms
	ii)	Max. noise at operator's ear level dB (A)	Evaluative	98 dB (A) as per CMVR	Nil	97.0	Conforms
6. Header lifting Test							
	i)	Satisfactory completion of header lifting test	Evaluative	-	Nil	Satisfactory completed	Conforms
7. Discard limit							
	a)	Cylinder bore diameter, mm	Evaluative	104.40	Should not exceed the values declared by the manufacture	104.05	Conforms
	b)	Piston diameter, mm	Evaluative	103.388	-do-	103.93	Conforms
	c)	Piston to cylinder liner clearance at skirt	Evaluative	0.80	-do-	0.11	Conforms
	d)	Ring end gap, mm i) Top compression ring ii) 2nd compression ring iii) Oil ring	Evaluative	 2.0 2.0 2.0	-do-	 0.70 0.70 0.70	 Conforms Conforms Conforms
	e)	Ring groove clearance, mm 1. Top compression ring 2. 2nd compression ring 3. Oil ring	Evaluative	 -- 0.35 0.35	-do-	NR as ring was tapered 0.06 0.05	 -- Conforms Conforms
	f)	Diametrical and axial clearance of big end bearing, mm Diametrical Axial	Evaluative	 0.9 1.0	-do-	 0.10 0.33	 Conforms Conforms
	g)	Diametrical and axial clearance of main bearings, mm Diametrical Axial/crank shaft end float	Evaluative	 0.9 1.0	-do-	 0.10 0.09	 Conforms Conforms
	h)	Thickness of brake lining, mm	Evaluative	--	NA	--	--
	i)	Thickness of clutch plate, mm	Evaluative	--	NA	--	--

8. Field performance								
	i)	Suitability for crops	Evaluative	Paddy (Wheel type) Paddy (Track type)		Nil	Paddy	Conforms
	ii)	Average processing losses (%)	Evaluative	Wheat Barley Rice Sorgum Maize Oil seed, rape Soya Beans	: : : : : : :	Max 3% Max 4% Max 4% Max 3% Max 4% Max 4% Max 5%	Nil	Paddy (max) 3.0%	Conforms
9. Safety requirement								
	a)	Guards against all moving parts	Evaluative	Belt and chain drives, pulleys hydraulic pipes		--	Provided	Conforms
	b)	Lighting arrangement	Evaluative	As per CMVR		-	Not applicable	--
	c)	Grain tank cover	Evaluative	Essential		-	Provided	Conforms
	d)	Spark arrester in engine's exhaust	Evaluative	Essential		-	Not provided as turbo charger is provided in exhaust	--
	e)	Stone trap before concave	Evaluative	Essential		-	Not provided	**Does not conform**
	f)	Rear view mirror	Evaluative	Essential		-	Provided	Conforms
	g)	Fire extinguisher	Evaluative	Essential		-	Not provided	**Does not conform**
	h)	Slip clutch at following drives – i) Cutting platform auger ii) Undershot conveyor drive iii) Grain & tailing elevator	 Evaluative Non evaluative Non evaluative	Essential		-	 Not provided Not provided Not provided	 **Does not conform** **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 70 mm, min	-	Provided	Conforms
	k)	Labelling of control and gauges	Evaluative	Essential	-	Not provided fully	**Does not conform in toto**
10. Material of construction :							
	i)	Knife guard should conforms to IS: 6024 - 1983	Non evaluative	The hardness should less than 163 HB	-	Hardness 234 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= 0.7147 % Mn= 0.7700%	 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=0.2727 %	**Does not conform**
11.Labelling of combine harvester							
		Labelling of combine harvester	Evaluative	Should conform to the requirements of CMVR alongwith max engine power/max PTO power and SFC	--	Max. engine power and SFC not specified on labelling plate	**Does not conform in toto**

12.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

19. COMMENTS AND RECOMMENDATIONS

19.1 Mechanical vibration

The amplitude of mechanical vibration of components marked as (*) in chapter 12 of this test 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 The max. crankshaft toque of engine does not meet the requirement of O.M. This MUST be looked into as it is evaluative parameter as per O.M.

19.3 The maximum operating temperature of coolant during engine performance test exceeds the limit declared by the applicant. It MUST be looked into as it is evaluative parameter as per O.M.

19.4 The dent marks were observed on the third piston crown of engine during wear analysis. It MUST be looked into.

19.5 The discard limit for clearance between valve stem & valve guide is not specified. It should be specified.

19.6 Field performance test

There was leakage of grains from rear of the tailing auger grain pan. The tailing auger grain pan was replaced by new one and however following features may be considered for providing on combine harvester.

i) Provision for speed variation for threshing cylinder
ii) Provision for speed variation of blower.

19.7 Ease of operation and safety provisions

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

ii) It is recommended that the symbols as per requirement of IS 6283 (Part II) 2007 may be provided.

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

iv) Drive safety arrangement (slip clutch) is not provided in undershot conveyor drive and grain & tailing elevator. It MUST be provided.

v) Fire extinguisher is not provided on machine. It is evaluative parameter as per O.M. It MUST be provided.

vi) Stone trap is not provided before threshing cylinder & concave. It MUST be provided as it is evaluative parameter as per O.M.

vii) Drive safety arrangement (slip clutch) is not provided at cutting platform auger. It MUST be provided.

viii) No safety is provided while starting engine as per IS 8133:1983. It should be provided.

ix) The location of hand operated control lever for increasing or decreasing the speed is not as per IS 8133:1983. It should be looked into.

x) The location of the steering lever is not as per IS 8133:1983. It MUST be looked into.

xi) It is recommended that the symbols as per requirement of IS 6283 (Part I) 2007 may be provided.

xii) Drive safety arrangement (slip clutch) is not provided at grain and tailing elevators. It should be provided.

xiii) Coolant water ratio is not specified. It should be specified.

19.8 Hardness and chemical composition

19.8.1 Chemical composition of knife blade is not within the limit specified in IS:6025-1982. It should be looked into for corrective action.

19.8.2 The carbon content of knife back does not conform to their relevant IS code. It should be looked into for improvement.

19.8.3 The hardness of knife guard does not conforms to the requirements of IS 6024-1983. It should be looked into for improvement.

19.9 On the labelling plate of the machine the Max. engine power (kW) and S.F.C. is not specified. It may be provided

19.10 The serial number of machine is not specified. It should be provided is regular production of machines.

19.11 The labelling of oiling and greasing points with frequency of service and grade of lubricant is not provided on machine. It should be provided.

19.12 **Literature supplied with the machine.**

The following literatures are provided by the applicant for reference during test with test sample which is only for name shake. They do not provided all essential information and far from satisfactory. It is recommended to update the literature as per IS 8132: 1999.

i) The operator and service manual

ii) Spare part catalogue of combine harvester

iii) Spare parts catalogue of engine

TESTING AUTHORITY

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

Test report compiled by: V.S. Shinde, Senior Technical Assistant.

20. APPLICANT'S COMMENTS

Para No	Our reference	Applicant's comment
20.1	19.1	To control the amplitude of vibration, dampening arrangement will be done.
20.2	19.4	We will take extra care during assembly.
20.3	19.6	Provision of speed variation for threshing cylinder and blower will be studied and implemented.
20.4	19.7(ii),(xi)	Recommended symbol will be provided in the production.
20.5	19.7(iv), (vii), (xii)	We will check the design suitability for slip clutch in the mentioned mechanism.
20.6	19.7(vi)	Stone trap provision will be studied and provided on design suitability.
20.7	19.7 (viii)	Safety provision while starting engine will be taken care in production.
20.8	19.7 (ix),(x)	We will look into location of levers and set as per standard.
20.9	19.8	We will discuss with our supplier and improve.
20.10	19.9	The labelling plate will be updated adding Max. Engine power and S.F.C.
20.11	19.11	The labelling of oiling and greasing stickers will be provided.
20.12	19.12	The literature will be updated as per recommendation for supplying with the machine.