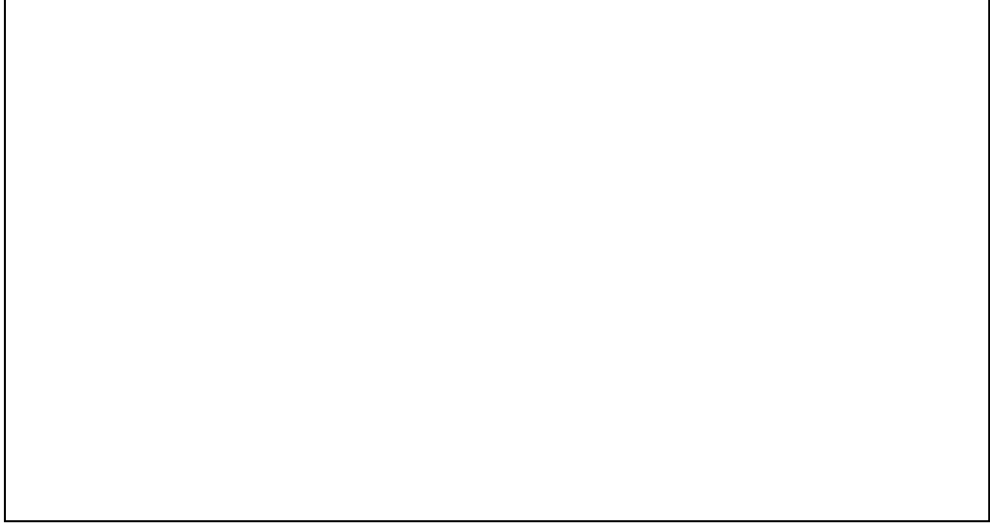


व्यावसायिक परीक्षण रिपोर्ट (प्रथम बैच) संख्या/No. : T- 1569/2097/2021
COMMERCIAL TEST REPORT (1st Batch) माह/Month : July, 2021
(यह परीक्षण रिपोर्ट 31/07/2026 तक वैध है/THIS TEST REPORT IS VALID UPTO: 31/07/2026)



EICHER 548 TRACTOR



भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय
(कृषि, सहकारिता एवं किसान कल्याण विभाग)

GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
(DEPARTMENT OF AGRICULTURE, CO-OPERATION AND FARMERS WELFARE)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
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“Eicher 548” tractor had undergone initial commercial test at this institute and report number T-975/1499/2015 was released in July, 2015, it’s supplementary test report no. T-1026/1499/2016, was released in May, 2016 & it’s administrative extension report no. T-1371/1898/2020 was released in March, 2020. Now the applicant has submitted an application no. TMTL/548/BT01/2020-21 dated 07.07.2020 for 1st batch testing of “Eicher 548” tractor. The performance results of the test sample submitted for the batch testing were evaluated as per IS: 12207-2019 and test report is released as under.

Manufacturer : **EICHER TRACTORS**
(A unit of TAFE Motors & Tractors Limited, a wholly owned subsidiary of TAFE)
Plot No.1, Sector - D, Industrial Area, Mandideep – 462 046, Distt. Raisen (M.P.)

Test requested by (the applicant) : The manufacturer
Selected for test by : The manufacturer
Place of running-in : At manufacturer’s works
Duration of said running-in, (h):
- Engine : 21
- Transmission : 32

Method of Selection : Due to Covid-19 Pandemic, it was not possible to conduct the random selection. Nor was possible for applicant to facilitate the random selection. As a last resort applicant requested to allow the direct submission of Test Sample, which was allowed.

1. SPECIFICATIONS

- 1.1 Tractor:**
- Make : Eicher
Model : Eicher 548
Variants, if any : None
Type : Four wheeled, rear wheel driven, general purpose, agricultural tractor
- Month & Year of manufacture : 05/20
Chassis number : 929313537424
Country of origin : India
- 1.2 Engine:**
- Make : Eicher
Model : 398E49
Type : Four stroke, naturally aspirated, air cooled, direct injection, diesel engine
- Serial number : 529127414395
Country of origin : India
- 1.2.1 Engine speed (rpm), (Manufacturer’s recommended production settings):**
- Maximum speed at no load : 2300 to 2400
- Low idle speed : 650 to 750
- Speed at maximum torque : 1000 to 1400
- Rated speed, (rpm):**
- For PTO use : 2150
- For drawbar use : 2150
- 1.3 Cylinder & Cylinder Head:**
- Number : Three
Disposition : Vertical, Inline
Bore/stroke, (mm) : 100/125 (apa)
Capacity as specified by the applicant, (cc) : 2945

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14. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

14.1 On the basis of tests conducted the performance results have been summarized as evaluative (mandatory) and non-evaluative (not-mandatory) parameter applicable for qualifying Minimum Performance Criteria as per Clause-4 (Table-1) of IS: 12207-2019 for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant (D) / Requirement (R)	As observed	Whether meets the requirements (Yes/No)
1	2	3	4	5	6	7
14.1.1	PTO Performance :					
a)	Max. power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: $\pm 5\%$ for PTO power or engine power >26 kW, $\pm 10\%$ for PTO power or Engine power ≤ 26 kW.	31.8 (D)	31.7	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	31.8 (D)	31.7	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	268 (D)	264	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	175 (D)	176	Yes
e)	Back-up torque, (percent)	Evaluative	12 percent, min.	12 (D) 12 (R)	24.8	Yes
f)	Maximum operating temperature, ($^{\circ}$ C)					
	1) Engine oil	Evaluative	The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	145 (D)	116	Yes
	2) Liner wall	Evaluative	The declared value should not exceed the boiling temperature of coolant under the pressurized or otherwise and the observed value under high ambient condition should not exceed the declaration.	240 (D)	154	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.64 (R)	0.80	Yes
h)	Smoke level, (m-1)	Evaluative	Maximum light absorption coefficient of 3.25 per metre or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	3.25 (R)	0.09	Yes

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1	2	3	4	5	6	7	
14.1.2	Drawbar performance:						
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 70% of static mass with ballast	18.7 (D)	22.48	Yes	
				18.47 (R) Minimum			
b)	Maximum drawbar pull with unballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without/ standard ballast	14.4 (D)	17.46	Yes	
				14.14 (R) Minimum			
c)	Maximum drawbar power without ballast, or with standard ballast as the case may be, kW	Evaluative	Minimum 80 % of PTO power as referred in SI No. i) a) of PTO performance in case of tractors having total static mass > 1500 kg Minimum 75 % of PTO power as referred in SI No. i) a) of PTO performance in case of light weight tractors having 1500 kg total static mass of tractor Minimum 75 % of the engine power as referred in SI No. i) a) of engine performance in case of tractors which do not have a PTO shaft.	25.4 (D)	26.8	Yes	
				25.4 (R) Minimum			
d)	Maximum transmission oil temperature, (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	110 (D)	77	Yes	
14.1.3	Power lift and hydraulic pump performance :						
a)	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Evaluative	±10 percent	14.0 (D)	14.56	Yes
	2)	With the standard frame	Evaluative	The lift capacity should at least be 24 kg/PTO kW. and it should be 21.5 kg/engine kW where the tractor is not provided with a PTO shaft	11.8 (D) 7.46 Minimum (R)	12.33	Yes
b)	Maximum drop in the height of the point of application of the force after each 5 minutes interval for a total duration of 30 minute, (mm)	Non Evaluative	The observed value should not exceed 50 mm	50 (D)	15	Yes	
				50 (R) Maximum			
14.1.4	Brake performance at 25 kmph:						
a)	Maximum stopping distance at a force equal to or less than 600 N on brake pedal with Un ballast*, (m):(*Road ballast is not recommended)						
	1)	Cold brake	Evaluative	10	10 (R)	7.74	Yes
	2)	Hot brake	Evaluative	10	10 (R)	7.86	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² , (N)	Evaluative	600	600 (R)	196 to 263	Yes	
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever	Evaluative	Yes / No	Yes (R)	Yes	Yes	

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1	2	3	4	5	6	7
14.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor, dB(A)	Evaluative	As per CMVR	88 (R)	84	Yes
b)	Maximum noise at operator's ear level, dB(A)	Evaluative	As per CMVR	96 (R)	95	Yes
14.1.6	Amplitude of mechanical vibrations at :					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	95	Yes
	2) Right foot rest	Evaluative			92	Yes
	3) Seat (with driver seated)	Non Evaluative	100 microns (max)	100 (R)	44	Yes
	4) Steering wheel	Non Evaluative	100 microns (max)	100 (R)	144	No
14.1.7	Air cleaner oil pull over test :					
	Maximum air cleaner oil pull-over, (%)	Evaluative	0.25 % (max.)	Dry type		Not applicable
14.1.8	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	As specified by the manufacturer	4.0 (D)	4.0 (D)	Yes
	2) Four wheel			5.0 (D)	5.0(D)	Yes
b)	Distance travelled / litre of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	As specified by the manufacturer	4.0 to 5.5 (D)	6.08	No
	2) Four wheel			4.0 to 5.5 (D)	5.83 to 5.91	No
c)	Fuel consumption, (ml/km/tonne):					
	1) Two wheel	Non Evaluative	As specified by the manufacturer	36 to 42 (D)	41.10	Yes
	2) Four wheel			34 to 40 (D)	33.85 to 34.33	Yes
14.1.9	Wetland cultivation :					
	Sealing for the following assemblies:	Evaluative	The identified assemblies should essentially meet the requirement of IS: 11082. No water ingress in the identified assembly given in column-2. If tractor does not meet the requirements of wetland cultivation, it may be recommended for dry land operation only.	There should be no ingress of water and / or mud (R)	No ingress of water and / or mud was reported during supplementary testing of this tractor mode, tested vide test report no. report No. T-1026/1499/2016 released in May 2016.	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine Oil	-do-				
	5) Transmission Oil	-do-				

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1	2	3	4	5	6	7
14.1.10	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pullies, silencer, hydraulic pipes (as per IS-12239 Part 2)		Meets the requirement	Yes
b)	Lighting arrangement	Evaluative	As per CMVR		Meets the requirement	Yes
c)	Seating requirements (Tractors having more than 1150 mm rear track width)	Non Evaluative	Should meet the requirements of IS: 12343 (As amended from time to time)		Meets the requirement	Yes
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)		Meets the requirement	Yes
e)	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-I) (As amended from time to time)		Does not meet the requirements	No
f)	Specifications of linkage drawbar	Evaluative	Should meet the requirements of IS 12953 (As amended from time to time)		Meets the requirement	Yes
g)	Specifications of Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirements of IS 12362 (Part 3) (As amended from time to time)		Not fitted	Not applicable
h)	1)	Maximum travelling speed at rated engine speed in reverse gears, (kmph)	Evaluative	Should not exceed 20 Kmph	12.36 (Meets the requirement)	Yes
	2)	Audible warning signal on tractor	Evaluative	As soon as the travelling speed in reverse gear reaches to 20 kmph, an audible warning signal on tractor shall be activated. Not applicable	Not applicable	--

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1	2	3	4	5	6	7	
14.1.11	Labelling of tractors (Provision of labelling plate):						
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO in kW and year of manufacture in numerical <table border="1" style="margin: 0 auto;"><tr><td>MM</td><td>YY</td></tr></table> Digit 01-12 in box No.1 for MM will represent the month and next two digit in the box No.2 for YY will represent the year of manufacturing	MM	YY	Eicher	Yes
MM	YY						
	2) Model	Evaluative		Eicher 548	Yes		
	3) Month & Year of manufacture	Evaluative		05 / 20	Yes		
	4) Engine number	Evaluative		529127414395	Yes		
	5) Chassis number	Evaluative		929313537424	Yes		
	6) Declaration of maximum PTO power, kW	Evaluative	31.8	Yes			
14.1.12	Discard limit for:						
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by Manufacturer	100.25	99.991 to 100.001	Yes	
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.72	0.107 to 0.118	Yes	
(c)	Piston diameter at skirt, (mm)	Non Evaluative		99.279	99.878 to 99.894	Yes	
(d)	Ring end gap, (mm):						
	Top comp. ring.	Evaluative	-do-	4.0	0.35	Yes	
	2 nd comp. ring.		-do-	4.0	0.55 to 0.60	Yes	
	Oil ring.		-do-	2.5	0.35 to 0.40	Yes	
(e)	Ring groove clearance, (mm):						
	Top comp. ring	Evaluative	-do-	Tapered ring		--	
	2 nd comp. ring		-do-	0.30	0.053 to 0.058	Yes	
	Oil ring		-do-	0.30	0.060 to 0.066	Yes	
(f)	Diametrical clearance of main bearings (mm)	Evaluative	-do-	0.60	0.108 to 0.135	Yes	
(g)	Clearance of big end bearings, (mm):						
	- Diametrical	Evaluative	-do-	0.60	0.090 to 0.135	Yes	
	- Axial	Evaluative	-do-	0.80	0.30	Yes	
(h)	Crankshaft end float, (mm)	Evaluative	-do-	0.80	0.32	Yes	
(j)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.60	0.08 to 0.13	Yes	
(k)	Clearance between center pin and bush, (mm)	Non Evaluative	-do-	0.60	0.09 to 0.10	Yes	
14.1.13	Literature (Submission to test agency)						
(a)	Operator manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes	
(b)	Parts Catalogue	Evaluative	Provided / Not Provided	Provided	Provided	Yes	
(c)	Workshop/ Service manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes	

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1	2	3	4	5	6	7
14.1.14	Fitment of Roll Over Protective Structure (ROPS): for tractors having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS:11821 or OECD code or equivalent International Standard	Not Provided	Not fitted	Not applicable
14.1.15	Standard accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Provided	Yes
14.1.16	Accessories (Optional)	Non Evaluative	Ballast weights if fitted should meet the requirement of CMVR.	Provided	Provided	Yes

14.2 CATEGORY OF BREAKDOWNS / DEFECTS :(As per clause 5.0 of IS-12207-2019)					
S. No.	Category of Breakdown	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	As observed	Whether meets the requirement (Yes/No.)
1.	Critical breakdown	Evaluative	There is no 'critical breakdown' during the course of testing	None	Yes
2.	Major breakdowns	Evaluative	There are not more than 1 major breakdowns and neither of them is of repetitive nature	None	Yes
3.	Minor breakdowns	Evaluative	There are not more than 3 minor defects during the test and the frequency of each is not be more than two	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed four that is, (1 major + 3 minor) or 4 minor breakdowns	None	Yes

14.3 Salient Observations:

14.3.1 Laboratory tests:

14.3.1.1 PTO Performance Test:

- i) The maximum PTO power was recorded as **31.7 kW** against the declaration of **31.8 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit and meet the requirement.
- ii) The specific fuel consumption corresponding to maximum power was recorded as **264 g/kWh** against the declaration of **268 g/kWh**, which is within the tolerance limit of IS: 12207-2019.
- iii) The maximum equivalent crankshaft torque was recorded as **176.0 N-m** against the declaration of **175.0 N-m**, which is within the permissible limit as specified in IS: 12207-2019.

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- iv) The backup torque is **24.8 %** and meets the requirement of IS: 12207-2019.
- v) During the maximum PTO power search test, max. PTO power found on higher side i.e. 34.7 kW against the declaration of **31.8 kW** and two fan belts of cooling system were broken. The fan belts were replaced with new one of the same specifications.
- vi) In second trail, maximum PTO power was found on higher side i.e. 34.4 kW against the declaration of 31.8 kW. On checking, fuel injection timing and valve tappet clearance were not found under specified limit as mentioned in technical specifications provided by the applicant. During the course of testing, fuel injection timing and valve tappet clearance of inlet and exhaust valves were adjusted to respective specified limits and PTO performance test was carried out.
This calls for stringent quality checking of all engine related components and settings.

14.3.1.2 Drawbar performance test:

During ten hours drawbar performance test, creeping of LHS & RHS rear tyre over the rims was recorded as **60 & 65 mm** respectively. This should be looked into for necessary corrective action.

14.3.1.3 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter – 8 of this test report is on higher side. This calls for dampening down of vibrations especially on right foot rest, operator’s seat and steering control wheel to improve the operational comfort and service life of components.

14.3.1.4 Specifications of three point linkage:

- i) The parameter Lateral distance from lower hitch point to centre line of tractor does not meet the requirement of IS: 4468 (Part-1) -1979. This should be looked into for necessary corrective action.
- ii) Some of the parameters of three point linkage conform to Cat. I and some of them conform to Cat.II. Keeping in view the spirit of standardization, necessary improvement may be incorporated.

14.4 Maintenance / Service Problems:

During PTO performance test following maintenance / Service were carried out:

- i) During maximum PTO power search test two fan belts of cooling system were found broken and damaged which were replaced with new one of same specifications.
- ii) After the replacement of fan belts, the observed maximum PTO power was on higher side. So on the request of applicant following work were carried out :-
 - a) Fuel filters were checked which were observed fine and refitted.
 - b) Fuel injection timing was checked. It which was found 19.5 ° before TDC against the manufacture specified limit of 16 ± 1 ° before TDC. So injection timing was adjusted to 15.3 ° before TDC.
 - c) Tappet clearances of the inlet and exhaust valves were checked. Tappet clearances were found 0.05 mm each for all inlet valves and 0.25, 0.10, and 0.05 mm for 1st, 2nd and 3rd exhaust valves respectively against the specified tappet clearance of 0.10 mm for both inlet and exhaust valves. So tappet clearances were adjusted to 0.10 mm for inlet and exhaust valves.
After all above adjustments as described in (b) & in (c), the maximum PTO power was observed as 31.7 kW against the declaration of 31.8 kW which meets the requirement of IS: 12207-2019 with regard to tolerance limit.

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14.5 Recommendation with regard to safety on tractor:

The following requirements, inter alia, may be considered for incorporation on the tractor:

- i) The spark arrester should be provided in the exhaust system as per the requirement of IS: 12239 (Part-1)-1996
- ii) PTO master shield should be provided.
- iii) Fuel shut-off knob should remain in "STOP" position.
- iv) Adequate Working clearance around control levers should be provided.

14.6 Adequacy of Literature supplied with machine:

14.6.1 Following literature has been submitted during the course of testing.


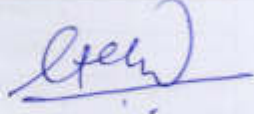
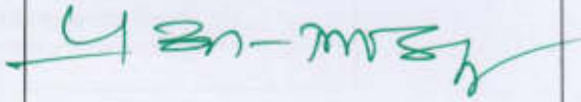
- i) Operator's manual of Eicher 548
- ii) Service manual Eicher 548
- iii) Parts catalogue of Eicher 548

14.6.2 The supplied literature was found adequate. Except the following:

- i) The lubrication oil grade of engine & transmission system was found different from the technical specifications.

14.6.3 However, these literatures should also be brought out in other vernacular languages of India for guidance of users.

TESTING AUTHORITY:

TESTING AUTHORITY:	
C.V. CHIMOTE TEST ENGINEER	
Y.K.RAO SENIOR AGRICULTURAL ENGINEER	
P.K. PANDEY DIRECTOR	

Draft test report is compiled by: NITESH KUMAR VERMA, AGRICULTURAL ENGINEER

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15. Applicant's comments

Para no.	Our reference	Comments received from the applicant
15.1	14.3.1.2	Have taken up with tyre manufacturer for the improvement.
15.2	13.1.8 (iii), (vii) & (viii)	These are being looked into w.r.t. corrective action.
	14.1.8, 14.1.10, 14.3.1.1, 14.3.1.3, 14.3.1.4 (i) & (ii)	
	14.4, 14.6.2	
15.3	14.5	Recommendations are being looked into w.r.t. design, development and implementation.

ANNEXURE - I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running-in	37.00
2.	PTO Performance Test	14.96
3.	Power lift and hydraulic pump performance test	1.50
4.	Drawbar performance test	16.0
5.	Brake test	1.00
6.	Noise measurement	1.50
7.	Mechanical vibration test	1.00
8.	Nominal speed test	1.20
B.	HAULAGE TEST	5.88
C.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	4.58
TOTAL:		84.62