

व्यावसायिक परीक्षण रिपोर्ट (वैरिएंट)
COMMERCIAL TEST REPORT (Variant)

संख्या/No. : T-1682/2213/2022
माह/Month : October, 2022

[ONLINE TESTING]

(यह परीक्षण रिपोर्ट 31/10/2027 तक वैध है / THIS TEST REPORT IS VALID UPTO 31/10/2027)



EICHER 557 4WD 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 & FARMERS WELFARE)
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Manufacturer : M/s. 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 (applicant) : The manufacturer
Selected for test by : The Testing authority
Place of running-in : At Testing Institute
Duration of said running-in, (h):
- Engine : 21
- Transmission : 32

Method of Selection : The test sample was selected randomly out of five tractors from the production line by the representative of testing authority through online.

Details of tractors made available for random selection	
S. No.	Chassis serial Number
1	931715222346
2	931715222332
3	931715222950
4	931715222468
5	931715222564

1. BACKGROUND

1. Base model "EICHER 557" tractor was under Initial commercial testing vide Test Report No. T-973/1492/2015 (May, 2015).
2. Administrative Extension of base model was conducted vide Test Report No. T-1370/1897/2020, (March, 2020).
3. First Batch Test of base model was conducted vide Test Report No. T-1585/2113/2021, (September, 2021).
4. Now applicant had submitted an application No. 28/2022-23/12 dated:12/05/2022 for variant test "Eicher 557 4WD" tractor as a variant of "Eicher 557" tractor.

The applicant have enclosed a list of following difference in the technical specification between "Eicher 557" & "Eicher 557 4WD" tractor and requested to test the "Eicher 557 4WD" tractor as the variant of "Eicher 557" tractor.

The major features of Base model and Variant model are listed below:

S. No.	Parameters	Base Model	Variant Model	Clause No. of IS:12207-2019
1.	Model of tractor	Eicher 557	Eicher 557 4WD	Permissible as per Note (S.No.3) below Table 3 of IS: 12207-2019.
2.	Type of tractor	Rear Wheel Drive, Standard Agricultural Tractor.	Four-wheel Driven, Standard Agricultural Tractor.	Permissible as per S.No. (x) of Table 2 of IS: 12207-2019.
3.	Wheel base, mm	2015	2075	Permissible as per S.No. (i) of Table 2 of IS: 12207-2019.

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During the examination, it was observed that proposed tractor is four wheel driven (4WD) where as base model is two wheel driven (2WD) and thus, meets the requirement of IS: 12207-2019.

Therefore, in pursuance of clause 8.4 and Sr.No. (i) & (x) of Table-2, the following tests were considered to be carried out:

- Specification checking
- Nominal speed test
- Two-hour maximum PTO performance test, under natural ambient condition
- Drawbar performance test
- Noise level test
- Location of Centre of Gravity
- Turning ability

2. FUEL AND LUBRICANTS

2.1 Fuel : The High-speed diesel oil supplied by M/s Indian Oil Corporation Limited having density of 0.826 g/cc at 15°C was used.

2.2 Lubricants:

S. No.	Particulars	As recommended by the manufacturer	As used during the test
1.	Engine & air cleaner oil	15W40	As recommended
2.	Gear box, rear differential, rear axle, rear final drive, hydraulic, brake & steering system oil	Elf, SF-3I	Oil originally filled in the tractor system were not changed
3.	Front differential, axle, & final drive	ENI Rotra Multi THT	
4.	Grease	MP Grease	MP Grease

3. ESSENTIAL TESTS

3.1. SPECIFICATIONS

S. No.	Parameter	Base Model	Variant Model	Remarks
1	2	3	4	5
3.1.1	Tractor:			
	Make	: Eicher	Eicher	No Change
	Model	: Eicher 557	Eicher 557 4WD	Changed
	Type	: Four wheeled, Rear-wheel driven, Standard, Agricultural Tractor	Four-wheel Driven, Standard Agricultural Tractor.	Changed
	Month & Year of manufacture	: 05/20	05/22	Changed
	Chassis number	: 929315237506	931715222950	Changed
	Country of Origin	: India	India	No Change
3.1.2	Engine:			
	Manufacturer's address	: Eicher Tractors, Engine Division (A unit of TAFE Motors & Tractors Ltd.) Itrana Road, ALWAR – 301 001, Rajasthan.	Eicher Tractors, Engine Division (A unit of TAFE Motors & Tractors Ltd.) Itrana Road, ALWAR – 301 001, Rajasthan.	No Change
	Make	: Eicher	Eicher	No Change
	Model	: 320 DED	320 DED	No Change

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1	2	3	4	5
	Type	: Four stroke, liquid cooled, naturally aspirated, direct injection, diesel engine	Four stroke, liquid cooled, naturally aspirated, direct injection, diesel engine	No Change
	Serial number	: 529126432310	531626462595	Changed
	Engine speed (Manufacturer's recommended production setting),(rpm):			
	- Maximum speed at no load	: 2325 to 2425	2325 to 2425	No Change
	- Low idle speed	: 600 to 800	600 to 800	No Change
	- Speed at maximum torque	: 800 to 1200	800 to 1200	No Change
	Rated speed, (rpm):			
	- For PTO use	: 2150	2150	No Change
	- For drawbar use	: 2150	2150	No Change
3.1.3	Cylinder & Cylinder Head:			
	Number	: Three	Three	No Change
	Disposition	: Vertical, Inline	Vertical, Inline	No Change
	Bore/stroke, (mm)	: 108/120 (apa)	108/120 (apa)	No Change
	Capacity as specified by the applicant, (cc)	: 3298	3298	No Change
	Compression ratio, (apa)	: 18.5 ± 0.5: 1	18.5 ± 0.5: 1	No Change
	Type of cylinder head	: Mono block	Mono block	No Change
	Type of cylinder liners	: Wet, replaceable	Wet, replaceable	No Change
	Type of combustion chamber	: Direct combustion, re-entrant type	Direct combustion, re-entrant type	No Change
	Arrangement of valves	: Overhead	Overhead	No Change
	Valve clearance (cold):			
	- Inlet valve, (mm)	: 0.35	0.35	No Change
	- Exhaust valve, (mm)	: 0.35	0.35	No Change
3.1.4	Fuel System:			
	Type of fuel feed system	: Gravity and force feed	Gravity and force feed	No Change
3.1.4.1	Fuel tank:			
	Capacity, (l)	: 47.4	48.0	Changed
	Location	: Above Flywheel housing	Above Flywheel housing	No Change
	Provision for draining of sediments/ water	: Not provided; however water separator is provided.	Not provided; however water separator is provided.	No Change
	Material of fuel tank	: Metallic	Metallic	No Change
3.1.4.2	Water separator			
	Make	: Alert	Alert (apa)	No Change
	Type	: Transparent, Inverted funnel gravity separation	Transparent, Inverted funnel gravity separation	No change
	Location	: Mounted on LHS of engine in between fuel tank and fuel feed pump.	Mounted on LHS of engine in between fuel tank and fuel feed pump.	No change
	Capacity, (l)	: 0.44	0.44	No change

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1	2	3	4	5	6	
	(c)	Wheel equipments:				Changed
		Steered Wheel(s):				
		Track width, (mm)	1480 (std.) & 1550	1430, 1530 (std.), 1560, 1620, 1630, 1740, 1750 & 1850.		
		Drive wheel(s):				Changed
		Track width, (mm)	1460, 1470 (std.), 1570, 1580, 1860 & 1980.	1460, 1470 (std.), 1580, 1590, 1740 & 1990		
	(d)	Unballasted mass of tractor, [Front/Rear/Total], (kg)	965 / 1440 / 2405	1188 / 1512 / 2700	Changed	
	(e)	Overall dimensions [length / width / height], (mm)	3700/ 1915/ 2210	3800 / 1910 / 2220	Changed	

7. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

7.1 On the basis of tests conducted the performance results have been summarized as evaluative (mandatory) and non-evaluation (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/ requirement		As observed		Whether variant model meets the requirements (Yes/No.)
				Base model	Variant Model	Base model	Variant model	
1	2	3	4	5 a	5 b	6 a	6 b	7
7.1.1	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.	33.83 (D)	33.83 (D)	35.4	34.0	Yes
b)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	265 (D)	265 (D)	260	267	Yes
7.1.2	Drawbar performance:							
a)	Maximum drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass with ballast	22.1 (D)	23.13 (D)	24.81	29.84	Yes
				21.49 minimum (R)	23.20 minimum (R)			
b)	Maximum drawbar pull with unballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without / standard ballast	17.2 (D)	18.47 (D)	19.88	25.46	Yes
				16.51 minimum (R)	18.53 minimum (R)			

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1	2	3	4	5 a	5 b	6 a	6 b	7
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.	27.1 (D) 28.3 minimum (R)	27.1 (D) 27.2 minimum (R)	29.8	28.8	Yes
d)	Maximum transmission oil temperature, (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company.	110 (D)	120 (D)	102	109	Yes
7.1.3 Noise measurement :								
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	88 dB (A) for >1.5 tonne GVW and 85 db (A) for <1.5 tonne GVW (as per CMVR)			83	85	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	96 (as per CMVR)			96	95	Yes
7.1.4 Safety features:								
a)	Guards against moving and hot parts	Evaluative	Belt drives, pullies, silencer, hydraulic pipes (As per IS 12239 (Part2).			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).			Does not meets the requirement		No
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 meets the requirement		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)	Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirement of IS: 12362 (Part 3) (As amended from time to time).			Not fitted		Not applicable

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1	2	3	4	5	6	7		
h)	1)	Maximum travelling speed at rated engine speed in reverse gears, Km/h	Evaluative	Should not exceed 20 Km/h	12.77 km/h (Meets the requirement)	Yes		
	2)	Audible warning signal on tractor	Evaluative	As soon as the travelling speed in reverse gear reaches to 20 km/h, an audible warning signal on tractor shall be activated. The safety aspects about the operation of shuttle technology shall be brought in operation and manufacturer/dealer shall ensure the training on this aspect to operator before the delivery of tractor.	Not applicable	Not applicable		
7.1.5	Labelling of tractors (Provision of labelling plate):							
	1)	Make	Evaluative	Should conform to the requirements of CMVR along with maximum PTO Power in kW and year of manufacture in numerical form. <table border="1" style="margin: 5px auto;"><tr><td>MM</td><td>YY</td></tr></table> Digit 01 – 12 in box No.1 for MM will represent the months and next two digits in box No.2 for YY will represent the year of Manufacturing.	MM	YY	Eicher	Yes
MM	YY							
	2)	Model	Evaluative		Eicher 557 4WD	Yes		
	3)	Month & Year of manufacture	Evaluative		05/22	Yes		
	4)	Engine number	Evaluative		531626462595	Yes		
	5)	Chassis number	Evaluative		931715222950	Yes		
	6)	Declaration of PTO power, (kW)	Evaluative		33.83	Yes		
	7)	Specific fuel consumption, (g/kWh)	Evaluative	265	Yes			
7.1.6	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		
7.1.7	Fitment of Roll Over Protective Structures (ROPS):							
	For tractor having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS:1182 or OECD code or equivalent International Standard.	Not Provided	Not fitted	Not Applicable		
7.1.8	Standard Accessories	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor.	Provided	Provided	Yes		
7.1.9	Accessories (optional)	Non Evaluative	Ballast weight, if fitted, should meet the requirement of CMVR.	Provided	Provided	Yes		

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7.2 CATEGORY OF BREAKDOWNS / DEFECTS:					
S. No.	Category of breakdowns	Category (Evaluative / Non-Evaluative)	Requirements as per IS: 12207-2019	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 three and frequency of each should not be more than two.	None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed five, that is, (2 major + 3 minor) or 5 minor breakdowns.	None	Yes

7.3 Salient Observations:

7.3.1 Laboratory tests:

7.3.1.1 Specifications of Power Take-off Shaft:

In addition to clockwise rotation of PTO shaft, anticlockwise rotation has also been provided in contrast of "clockwise rotation" recommended in Clause No.4 of IS: 4931-1995. The provision of anticlockwise rotation has the potential of rendering the tractor not conforming to IS: 4931 - 1995. In this case, it may lead to non-inclusion of tractor in the subsidy list. This should be looked into for necessary corrective action.

In response thereto, the applicant vide letter No. TMTL/5574WD/Variant/2022/02, dated 27.10.2022 has submitted that "the wrong part was fitted by mistake in production during transmission assembly. Hence, we wish to remove the anticlockwise PTO rotation speed by fitment of correct "lay shaft rear" (Part number-93621558) in transmission & thereby there would be only one direction of rotation i.e., clockwise, and which conforms to IS: 4931-1995 was allowed. Thus, tractor now became IS: 4931-1995 conformant.

7.3.1.2 Operator's seat:

- i) Provision for adjustment of driver's mass has been specified as 50 to 120 kg against the requirement of 40 to 100 kg.
- ii) Vertical distance from Seat Index Point to foot rest was measured 555 mm which is not within the required range of 450 to 520 mm.

Above parameters does not meet the requirement of IS: 12343-2021. This should be looked into for necessary corrective action.

7.3.1.3 Three-point linkage:

- i) The lateral distance from lower hitch point to centre line of tractor was observed 364 mm against the requirement of 435 mm, which not meet the requirement of IS: 4468 -1997 (Part-1). This should be looked into for necessary corrective action.

7.4 Maintenance / Service Problems:

No noticeable maintenance or service problem was observed during the test.

7.5 Recommendation with regard to safety on tractor:

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

- i) The spark arrester in the exhaust system should be provided as per IS: 12239 (Part-1)-2018.
- ii) Fuel shut off knob does not remain in stop position without the application of sustained manual effort.
- iii) PTO master shield should be provided on tractor as per IS:4931-1995 (Reaffirmed in January, 2019).

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- iv) The working clearance around the position control & draft control lever was measured as 45 mm, position control lever & mudguard was measured 55 mm against the minimum requirement of 70 mm. This should be provided as per the requirement of IS: 12239 (Part-2) - 1999, (Reaffirmed in January, 2019).
- v) Distance between engine start control and stopping control was measured 335 mm against max. requirement of 150 mm.
- vi) The hand accelerator lever, when moved away from the operator (i.e. forward) decreases the engine speed, which does not meet the requirement as laid down in Table – 1 of IS: 8133-2021.

Above parameters should be looked into for necessary corrective action.

7.6 Adequacy of Literature supplied with machine:

The following literature of tractor models was supplied with the test sample for reference during the test.

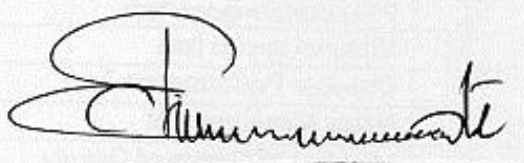
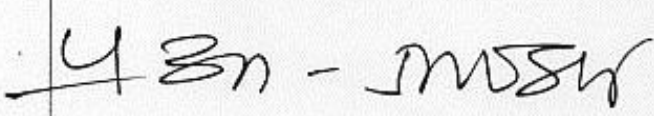
- a) Operator's manual of Eicher 557 4WD tractor model.
- b) Service manual of Eicher 557 4WD tractor model.
- c) Service Parts catalogue of Eicher 557 4WD tractor model.

7.6.1 The operator manual may be brought out for guidance of users and service personnel as IS: 8132-1999 incorporating, inter alia, the following:

- i) Recommended ballast masses for different operations.
- ii) Coolant water ratio.

The results of the tests carried out on variant model "Eicher 557 4WD" tractor have been compared with those on base model "Eicher 557" tractor tested vide test report No. T-1585/2113/2021 (September, 2021) which was found within the limit, as specified in IS: 12207-2019.

TESTING AUTHORITY:

C.V. CHIMOTE TEST ENGINEER	
P. K. PANDEY DIRECTOR	

Draft test report is compiled by: Vithato Keyho, Senior Technical Assistant.

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8. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments			
8.1	7.3.1.1	The applicant vide letter No. TMTL/5574WD/Variant/2022/02, dated 27.10.2022 has submitted that "the wrong part was fitted by mistake in production during transmission assembly. Hence, we wish to remove the anticlockwise PTO rotation speed by fitment of correct 'lay shaft rear' in transmission".			
		S. No.	Parts Name	Parts Number	Quantity
		1	Lay Shaft Rear	93621558	01
8.2	7.3.1.2 (i) & (ii) ,7.3.1.3,7.6.1 (i) & (ii)	Observation will be studied and necessary action will be initiated.			
8.3	7.5	Recommendation will be looked into with respect to design, development & implementation.			

ANNEXURE-I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running - in	53.0
2.	PTO performance test	3.1
3.	Nominal speed test	1.5
4.	Drawbar Performance Test	18.2
5.	Noise Measurement	1.5
6.	Location of Centre of Gravity	0.5
7.	Turning ability	0.7
B.	Miscellaneous test and other run hours, including idle run transportation, trial and preparation for test.	2.6
Total		81.1