

व्यावसायिक परीक्षण रिपोर्ट
COMMERCIAL TEST REPORT (Initial)

संख्या/No. : T- 1031/1556/2016
माह/Month : July, 2016

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EICHER, EICHER 485 USJ TRACTOR



सत्यमेव जयते

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

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2008 Certified Institute)

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Page 1 of 48

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
Place of running-in	:	At Applicant's works
Duration of said running-in, (h):		
- Engine	:	21
- Transmission	:	32
Method of Selection	:	The tractor was submitted directly by the applicant for test. Hence, method of selection is not known.

1. SPECIFICATIONS

1.1 Tractor:

Make	:	Eicher
Model	:	Eicher 485 USJ
Variants, if any	:	Not specified
Type	:	Four wheeled, rear-wheel driven, unit construction, Standard Agricultural Tractor
Year of manufacture	:	2015
Chassis number	:	922911521340
Country of origin	:	India

1.2 Engine:

Make	:	Eicher
Model	:	398 ED
Type	:	Air cooled, four stroke, direct injection, diesel engine
Serial number	:	522727234154

1.2.1 Engine speed(Manufacturer's recommended production setting), (rpm):

- 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
Compression ratio	:	17.5 ± 0.5 : 1
Type of cylinder head	:	Cast aluminum alloy with swirl port.
Type of cylinder liners	:	Dry, non replaceable
Type of combustion chamber	:	Direct combustion, re-entrant type
Arrangement of valves	:	Overhead, inline

T-1031/1556/2016	EICHER, EICHER 485 USJ TRACTOR - Commercial (Initial)
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16. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

Sl. No.	Adjustments / Defects / Breakdowns and Repairs	Tractor run hours
- Nil-		

17. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

17.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2014 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: 12207-2014	Values declared by the applicant (D)/ Requirement (R)	As observed	Whether meets the requirements (Yes/No.)
1	2	3	4	5	6	7
17.1.1	PTO Performance :					
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 kW. -7.5/+10% for PTO power ≤ 26 kW or-5 / +10% for Engine power >26 kW. -7.5/+10% for Engine power ≤ 26 kW	27.95 (D)	28.3	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	27.95 (D)	28.3	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	± 5%	265 (D)	269	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	160(D)	173.3	Yes
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	10 percent, min(R)	37.9	Yes
f)	Maximum operating temperature, (°C)					
	1) Engine oil	Non 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)	124	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)	165	Yes

T-1031/1556/2016	EICHER, EICHER 485 USJ TRACTOR - Commercial (Initial)
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1	2	3	4	5	6	7	
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	Maximum 2.72 (R)	0.35	Yes	
h)	Smoke level	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 per meter (R)	0.30	Yes	
17.1.2	Drawbar performance :						
a)	Max. drawbar pull with ballast corresponding to 15 percent wheel slip, (kN)	Non Evaluative	Minimum 65% of static mass with ballast	17.40 (D)	20.65	Yes	
				17.66 (R) Minimum			
b)	Max. drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 65% of static mass of tractor without ballast	13.40 (D)	14.95	Yes	
				13.64 (R) Minimum			
c)	Maximum drawbar power without ballast, (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.	22.36 (D) 22.60 (R) Minimum	22.9	Yes	
d)	Max. transmission oil temperature (°C)	Non Evaluative	The declared value should not exceed the maximum value specified by oil company	115 (D)	102	Yes	
17.1.3	Power lift and hydraulic pump performance :						
a)	Maximum lifting capacity throughout the range of lift, (kN):						
	1)	At hitch points	Non Evaluative	[Tolerance of minus 10%]	11.80 (D)	12.75	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	9.80 (D) 6.66 (R) Minimum	10.51	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 Minutes, (mm)	Non Evaluative	Observed value should not exceed 50 mm.	50 (D)	26	Yes	

T-1031/1556/2016	EICHER, EICHER 485 USJ TRACTOR - Commercial (Initial)
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1	2	3	4	5	6	7
17.1.4	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):					
	1) Cold brake	Evaluative	10	10 (R)	8.16	Yes
	2) Hot brake	Evaluative	10	10 (R)	8.30	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	246 to 264	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
*The manufacturer has not recommended ballasting for road test. Therefore, the brake test was conducted under unballasted condition only.						
17.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor, dB(A)	Evaluative	As per CMVR	88 (R)	85	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	96	Yes
17.1.6	Amplitude of mechanical vibrations at :					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	130	No
	2) Right foot rest			100 (R)	210	No
	3) Seat (with driver seated)			100 (R)	50	Yes
	4) Steering wheel			100 (R)	90	Yes
17.1.7	Air cleaner pull over:	Non Evaluative	0.25% (Max)	0.25%	0.13%	Yes
17.1.8	Haulage requirements :					
a)	Gross mass of the trailers, (tones):					
	1) Two wheel	Non Evaluative	--	4.0 (D)	4.0	Yes
	2) Four wheel	Evaluative	--	5.0 (D)	5.0	Yes
b)	Distance travelled / liter of fuel consumption, (km/l):					
	1) Two wheel	Non Evaluative	--	4.0 to 5.5 (D)	5.58 to 5.74	Yes
	2) Four wheel	Evaluative	--	4.0 to 5.5 (D)	5.23 to 5.82	Yes
c)	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non Evaluative	--	36 to 42 (D)	43.5 to 44.7	No
	2) Four wheel	Evaluative	--	36 to 42 (D)	34.3 to 38.2	Yes

1	2	3	4	5	6	7
17.1.9	Wetland cultivation :					
	Sealing for the following assemblies:	Evaluative	<p>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.</p>	There should be no ingress of water and/or mud	No ingress of water and/or mud was observed	Yes
	1) Clutch assembly	-do-				
	2) Brake housings	-do-				
	3) Front axle hubs	-do-				
	4) Engine oil	-do-				
	5) Transmission oil	-do-				
17.1.10	Safety features :					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes As per IS 12239 (part 2)	Requirements as per clause no.4 of table no. 1	Meets the requirement	Yes
b)	Lighting arrangement	Evaluative	As per CMVR	--do--	Meets the requirement	Yes
c)	Seating requirement (Tractors having more than 1150 mm rear track width)	Non Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	--do--	Does not meet the requirement	No
d)	Technical requirements for PTO shaft	Non Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	--do--	Meets the requirement	Yes
e)	Dimension of three point linkage	Non Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	Requirements as per clause no.4 of table no. 1	Does not meet the requirement	No
f)	Specification of linkage drawbar	Non Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--do--	Meets the requirement	Yes
g)	Specification of swinging drawbar	Non Evaluative		--do--	Not provided	N.A.

T-1031/1556/2016	EICHER, EICHER 485 USJ TRACTOR - Commercial (Initial)
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1	2	3	4	5	6	7
17.1.11	Labeling of tractors (Provision of labeling plate):					
	1) Make	Evaluative	Should conform to the requirements of CMVR along-with declared value of PTO HP	--	Eicher	Yes
	2) Model	Evaluative		--	Eicher 485 USJ	Yes
	3) Year of manufacture	Evaluative		--	2015	Yes
	4) Engine serial number	Evaluative		--	522727234154	Yes
	5) Chassis number	Evaluative		--	922911521340	Yes
	6) Declaration of PTO power, (kW)	Evaluative		--	27.95	Yes
17.1.12	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by the manufacturer	100.25	99.99 to 100.00	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.72	0.121 to 0.128	Yes
(c)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	4.0	0.30 to 0.33	Yes
	- 2 nd comp. ring.		-do-	4.0	0.45 to 0.48	Yes
	- Oil ring.		-do-	3.0	0.35 to 0.38	Yes
(d)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	0.30	Tapered rings	--
	- 2 nd comp. ring.		-do-	0.30	0.057 to 0.067	Yes
	- Oil ring.		-do-	0.30	0.064 to 0.068	Yes
(e)	Clearance of main bearings (mm):					
	- Diametrical clearance	Evaluative	-do-	0.90	0.101 to 0.122	Yes
	- Crankshaft end float	Evaluative	-do-	0.90	0.25	Yes
(f)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.90	0.107 to 0.121	Yes
	- Axial	Evaluative	-do-	0.90	0.25 to 0.28	Yes
(g)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.80	0.08 to 0.11	Yes
(h)	Clearance between centre pin and bush, (mm)	Non Evaluative	-do-	0.80	0.08 to 0.16	Yes
17.1.13	Literature (Submission to test agency)					
(a)	Operator manual	Evaluative	Provided/ Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided/ Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes
(c)	Workshop/ Service manual	Evaluative	Provided/ Not Provided	As per relevant IS Code (IS 8132)	Provided	Yes

T-1031/1556/2016	EICHER, EICHER 485 USJ TRACTOR - Commercial (Initial)
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17.1.14 CATEGORY OF BREAKDOWNS / DEFECTS :					
S. No.	Category of breakdowns	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	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 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

17.2 Optional requirements as per Clause-4 (Table-2) of IS:12207-2014:				
S. No.	Characteristic	Requirements as per IS: 12207-2014	As observed	Whether meets the requirements (Yes/No.)
1.	Fitment of ROPS	With a provision for fitment of ROPS.	Not provided	No
		If ROPS fitted it should meet the requirement of IS: 11821-1992.	Not provided	Not applicable
2.	Accessories	Trailer hitch, front tow hook may be provided.	Provided	Yes

17.3 Conformity with following IS:

- i) Guidelines for declaration of power and specific fuel consumption and labeling of agricultural tractors (First revision) [IS 10273:1987 (Reaffirmed in March, 2009)] : **Conforms**
- ii) Agricultural tractors – Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS: 4931-1995 (Reaffirmed in March, 2009)] : **Conforms**
- iii) Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468 (Part-I):1997 (Reaffirmed in February, 2012)] : **Does not conform**
- iv) Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed in February, 2012)] : **Conforms**
- v) Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed in March, 2009)] : **Does not conform**
- vi) Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision) : [IS 12239 (Part-1)-1996 (Reaffirmed in February, 2012) / ISO 4254-1:1989] : **Does not conform**

- vii) Tractors and machinery for agriculture and forestry – : **Does not conform**
 Technical means for ensuring safety Part 2: Tractors (first revision) IS 12239 (Part-2)-1999 (Reaffirmed in March, 2009)]
- viii) Tractors and machinery for agriculture and forestry, : **Conforms**
 powered lawn and garden equipment – Symbols for operator controls and other displays – Symbols for Agricultural Tractors and Machinery [IS: 6283 (Part-2) – 2007(Reaffirmed in March, 2009) / ISO 3767-2:1991]]
- ix) Guidelines for location and operation of operator : **Does not conform**
 controls on agricultural tractors and machinery (first revision) (IS: 8133 – 1983) (Reaffirmed in March, 2009) / ISO 3789: 1982]
- x) Agricultural Tractor & Machinery Lighting device for : **Conforms**
 travel on public roads [IS: 14683-1999 (Reaffirmed in March, 2009)]

17.4 Salient Observations:

17.4.1 Laboratory tests:

17.4.1.1 PTO Performance:

- i) The maximum PTO power was recorded as **28.3 kW** against the declaration of **27.95 kW** which meets the requirement of IS: 12207-2014 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was measured as **269 g/kWh** against the declaration of **265 g/kWh**, which is within the tolerance limit of IS: 12207-2014.
- iii) The backup torque is **37.9%**.

17.4.1.2 Mechanical Vibration:

The amplitude of mechanical vibration on various assemblies marked as (*) in Chapter-9 of this test report are on higher side especially at left and right foot rest. This calls for dampening down of vibrations to improve the operational comfort and service life of components.

17.4.1.3 Three point linkage:

The diameter of lower hitch points & lateral distance from lower hitch point to centre line of tractor does not meet the requirement of IS: 4468 (Part-1)-1997. This should be looked into for necessary corrective action.

17.4.1.4 Linkage drawbar:

Some of the parameters of the drawbar linkage conform to Cat.-I and some of them conform to Cat.-II. Keeping in view of the spirit of standardization, the necessary improvements may be incorporated.

17.4.1.5 Operator's Seat

The length & width of seat and vertical distance of SIP from steering control wheel does not meet the requirement of IS: 12343-1998 (Re-affirmed in March, 2009) and calls for necessary corrective action.

17.4.1.6 Location and movement of various controls

The stop control lever does not remain in 'Stop' position without application of sustainable manual effort. This is not meeting the requirement of IS: 8133 -1983 (Re-affirmed in March, 2009). This should be looked into necessary corrective action.



(Initial)

T-1031/1556/2016

EICHER, EICHER 485 USJ TRACTOR - Commercial (Initial)

17.4.2 Field performance test:**17.4.2.1 Haulage performance:**

- i) The fuel consumption (ml/km/tonne) with two wheel trailer was observed as 43.5 to 44.7 ml/km/tonne against the declaration of 36.0 to 42.0 ml/km/tonne for two wheel trailer. This does not meet the requirement of IS: 12207-2014 and therefore, should be looked into for necessary corrective action.

17.4.2.2 Wet land cultivation (Puddling operation):

No ingress of mud/or water was noticed during puddling operation of the tractor. Hence, It meets the requirements of IS: 11082-1984 (Technical requirements of agricultural tractors for wetland operation). The tractor is found suitable for wetland operation (Puddling).

17.5 Maintenance / Service Problems:

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

17.6 Recommendation with regard to safety on tractor:

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

- i) Provision for spark arresting device in exhaust system.
- ii) Provision of differential lock.
- iii) Provision of PTO shaft master shield.

17.7 Adequacy of Literature supplied with machine:**17.7.1** The following literature was supplied with the tractor for reference during the test.


- i) Operator's manual (for Eicher – 485 USJ tractor model)
- ii) Parts catalogue (for Eicher - 485 USJ tractor model)
- iii) Service manual (for Eicher - 485 USJ/368 USJ tractor model)

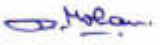
17.7.2 The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.**18. CITIZEN CHARTER**

Time frame for Testing & Evaluation as per Citizen Charter	Duration of Test	Whether the Test Report is released within the time frame given in Citizen Charter	Remarks
10 Months	10 Months (September, 2015 to July, 2016)	Yes	None

TESTING AUTHORITY:


PRAMOD YADAV
 AGRICULTURAL ENGINEER


C. V. CHIMOTE
 TEST ENGINEER


R.M. TIWARI
 SENIOR AGRICULTURAL ENGINEER


J. J. R. NARWARE
 DIRECTOR

Page 45 of 48

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE – BUDNI

Page 46 of 48

19. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
19.1	17.4.1.3,17.4.1.4,17.4.1.5 & 17.4.1.6	These are being looked into and will be incorporated accordingly.
19.2	17.6	Recommendations are being looked into w.r.t. design, Development & Implementation.

Annexure- I**BRIEF SPECIFICATION OF IMPLEMENTS USED DURING FIELD TEST**

S. No	Item	Disc Plough	Rotavator
1.	Make	Field king	Shaktimaan
2.	Type	Mounted	Mounted
3.	No. of Disc/blades	Three	42,in 7 flange
4.	Type of Disc/blades	Plane concave	L shape
5.	Size of bottoms/blades, (mm)	270	250 x 80 x 7
6.	Spacing of bottoms/flanges, (mm)	365	250
7.	Lower hitch point span, (mm)	890	720
8.	Mast height, (mm)	550	530
9.	Overall dimensions, (mm):		
	- Length	2020	2040
	- Width	1160	1150
	- Height	1210	1160
10.	Gross mass, (kg)	350	420

Annexure- II**BRIEF SPECIFICATION OF FULL CAGE WHEEL**

S. No.	Items	Specifications
1.	Type	full cage wheel
2.	Dia, (mm)	1210
3.	Width, (mm)	900
4.	No. and types of lugs	24, straight lugs made up of MS-angle section welded to angle iron frame.
5.	Size of angle section, (mm)	40 x 40 x 5
6.	Length of lugs, (mm)	444
7.	Spacing of lugs, (mm)	290
8.	Weight of each cage wheels (kg)	120

Annexure – III**TRACTOR RUN HOURS DURING TEST**

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	12.0
3.	Power lift and hydraulic pump performance test	3.6
4.	Drawbar performance test	18.2
5.	Turning ability	0.2
6.	Location of centre of gravity	0.2
7.	Operator's field of vision	--
8.	Brake test	1.8
9.	Noise measurement	1.4
10.	Air Cleaner oil pullover test	3.5
11.	Mechanical vibration test	1.0
12.	Nominal speed test	0.5
B.	FIELD TEST:	
1.	Disc Plough	10.1
2.	Rotavation	10.5
3.	Wet land (puddling) operation (including water proof test)	15.2
C.	HAULAGE TEST:	5.7
D.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	3.0
	TOTAL:	86.9