

[ONLINE TESTING]

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EICHER 368 USJ TRACTOR



भारत सरकार
कृषि एवं किसान कल्याण मंत्रालय
(कृषि, सहकारिता एवं किसान कल्याण विभाग)
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T-1612/2143/2021	EICHER 368 USJ TRACTOR – COMMERCIAL (FIRST BATCH TEST)
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The “**Eicher 368 USJ**” tractor had undergone “**Initial Commercial Test**” at this Institute, bearing report No. **T-1080/1605/2017** released in **March, 2017** and **Commercial Administrative Extension** test report No. **T-1373/1900/2020 (March, 2020)**. Now, the applicant has submitted online application No.28/2021-22/38 dated 29/12/2020 for batch testing of “**Eicher 368 USJ**” Tractor.

All the necessary tests as per table-1 of clause 6.0. of IS: 5994 -1998 (Reaffirmed in 2019) were carried out and test report released as under:

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	: CFMT&TI, Budni (M.P.)
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.

1. SPECIFICATIONS

1.1 Tractor:	
Make	: Eicher
Model	: Eicher 368 USJ
Variants, if any :	: None
Type	: Four wheeled, Rear wheel driven, Unit construction, General Purpose, Agricultural Tractor.
Month & Year of manufacture	: 06 & 21
Chassis number	: 930612469354
Country of Origin	: India
1.2 Engine:	
Make	: Eicher
Model	: 398 EDD
Type	: Four stroke, air cooled, naturally aspirated, direct injection, diesel engine
Serial number	: 530627656682
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

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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 require ments (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.	25.8 (D)	25.9	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	25.8 (D)	25.9	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	258(D)	247	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	145(D)	145.9	Yes
e)	Back-up torque, percent	Evaluative	12 percent, min.	12 (D) 12 (R)	26.6	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)	128	Yes
	2) Cylinder liner (air cooled engine)	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)	163	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.50 (R) Maximum	1.03	Yes
h)	Smoke level, (m^{-1})	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hat ridge value (As per CMVR)	3.25 (R)	0.04	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	18.40 (D) 18.05 (R) Minimum	20.02	Yes
b)	Maximum drawbar pull without ballast corresponding to 15 percent wheel slip, (kN)	Evaluative	Minimum 70% of static mass of tractor without/ standard ballast	14.21(D) 13.73 (R) Minimum	15.18	Yes
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.	20.6(D) 20.7 (R) Minimum	22.6	Yes
d)	Maximum transmission oil temperature (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company.	115(D)	78	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	11.80 (D)	11.89	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) 6.10(R) Minimum	10.69	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) 50 (R) Maximum	05	Yes
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 road ballast, (m):					
	1) Cold brake	Evaluative	10	10 (R)	7.5	Yes
	2) Hot brake	Evaluative	10	10 (R)	7.47	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	150 to 166	Yes

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1	2	3	4	5	6	7
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400N at hand lever, N	Evaluative	Yes / No	Yes (R)	Yes	Yes
14.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (R)	86	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	94	Yes
14.1.6	Amplitude of mechanical vibrations at :					
	1) Left foot rest	Non Evaluative	100 microns (max)	100 (R)	33	Yes
	2) Right foot rest				125	No
	3) Seat (with driver seated)				74	Yes
	4) Steering wheel				77	Yes
14.1.7	Air cleaner oil pull over :					
	Maximum air cleaner oil pull over	Evaluative	0.25 % (max.)	0.25 (R)	0.22	Yes
14.1.8	Haulage requirements :					
a)	Gross mass of the trailers, (tonne):					
	1) Two wheel	Non Evaluative	As specified by the manufacturer	4.0 (D)	4.0	Yes
	2) Four wheel			5.0 (D)	5.0	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)	5.74 to 5.91	No
	2) Four wheel			4.0 to 5.5 (D)	5.51 to 5.67	No
c)	Fuel consumption (ml/km/tonne):					
	1) Two wheel	Non Evaluative	As specified by the manufacturer	36 to 48 (D)	42.31 to 43.52	Yes
	2) Four wheel			36 to 48 (D)	35.29 to 36.27	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 mud and / or water was observed during ICT vide test report no. T-1080/1605/2017 (March,2017)	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, pulleys, silencer, hydraulics pipes(as per IS-12239 Part 2)		Meet the requirements	Yes
b)	Lighting arrangement	Evaluative	As per CMVR		Meet the requirements	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 meet the requirements	No
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)		Meet the requirements	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)		Meet the requirements	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 provided	Not applicable
h)	1) Maximum travelling speed at rated engine speed in reverse gears, kmph	Evaluative	Should not exceed 20 Kmph		(12.24 kmph) Meet the requirements	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 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
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 MM YY 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		Eicher	Yes
	2) Model	Evaluative			Eicher 368 USJ	Yes
	3) Month & Year of manufacture	Evaluative			06 & 21	Yes
	4) Engine number	Evaluative			530627656682	Yes
	5) Chassis number	Evaluative			930612469354	Yes
	6) Declaration of PTO power, kW (hp)	Evaluative			25.8 (35.1)	Yes
	7) Specific fuel consumption ,g/kWh (g/hph)	Evaluative			258 (189.8)	Yes

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1	2	3	4	5	6	7
14.1.12	Discard limit for:					
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by Manufacturer	100.25	99.985 to 99.998	Yes
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.72	0.121 to 0.136	Yes
(c)	Piston diameter at skirt, mm	Non Evaluative		99.279	99.872	Yes
(d)	Ring end gap (mm):					
	- Top comp. ring.	Evaluative	-do-	4.0	0.20 to 0.25	Yes
	- 2 nd comp. ring.		-do-	4.0	0.40 to 0.45	Yes
	- Oil ring.		-do-	3.0	0.25 to 0.30	Yes
(e)	Ring groove clearance (mm):					
	- Top comp. ring.	Evaluative	-do-	NA	Tapered	Not applicable
	- 2 nd comp. ring.	-do-	-do-	0.30	0.066 to 0.070	Yes
	- Oil ring.	-do-	-do-	0.30	0.057 to 0.065	Yes
(f)	Clearance of main end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.90	0.09 to 0.11	Yes
	- Crank shaft end float	Evaluative	-do-	0.90	0.28	Yes
(g)	Clearance of big end bearings, (mm):					
	- Diametrical	Evaluative	-do-	0.90	0.09 to 0.10	Yes
	- Axial	Evaluative	-do-	0.90	0.30	Yes
(h)	Clearance between king pin and bush, (mm)	Non Evaluative	-do-	0.80	0.09 to 0.12	Yes
(i)	Clearance between center pin and bush, (mm)	Non Evaluative	-do-	0.80	0.08 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
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

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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 Drawbar performance :

The creeping of LHS & RHS tyre over rim was recorded as **40 & 35 mm** respectively during 10 hours drawbar performance test. This should be looked into for necessary corrective action.

14.3.1.2 Mechanical Vibration:

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

14.3.1.3 Three point linkage:

Lateral distance from lower hitch point to centre line of tractor does not meet the requirement and some of the parameters conform to Cat. I and some of them conform to Cat.1N. Keeping in view the spirit of standardization, necessary improvement may be incorporated.

14.3.1.4 Operator's Seat

The length of seat from Seat Index Point does not meet the requirement of the IS: 12343 -1998 (Re-affirmed in 2019). This should be looked into for necessary corrective action.

14.3.1.5 Operator's work place:

Operator's work place meets the requirements of IS: 12239 (Part-1)-2018, except the provision of spark arresting device in the exhaust system.

14.3.2 Haulage performance:

The distance travel per litre of fuel consumption in case of two and four wheel trailer was observed as **5.74 to 5.91 km/l & 5.51 to 5.67 km/l** against the declaration of **4.0 to 5.5 km/l**. The observed value is on higher side and does not meet the non-evaluative requirement of IS: 12207-2019 with regard to tolerance. This should be looked into for necessary corrective action.


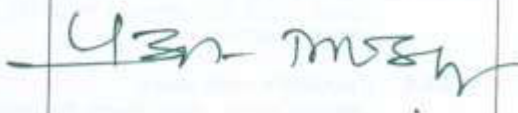
14.4 Maintenance / Service Problems:

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

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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) Provision of spark arresting device in exhaust system.
 - ii) Provision of PTO master shield.
 - iii) Provision of Minimum Cautionary notice as per clause 11.2 of IS: 12239 (Part-II)-1996 (Re-affirmed in 2019).
 - iv) Provision of working clearance between hand control namely position control lever and mudguard and position control and draft control lever should be provided as per IS: 12239 (part-2)-1999 (Reaffirmed in 2019).
 - v) Length of seat from Seat Index Point does not meet the requirement. It should be provided as per IS: 12343-1998, (Re-affirmed in 2019).
 - vi) Provision of Differential lock.
 - vii) Coupling to attach trailer brakes should be provided.
 - viii) Fuel shut off knob should remain in stop position.
- 14.6 Adequacy of Literature supplied with machine:**
- 14.6.1** The following literatures were supplied with the test tractor for reference during the test:-
- a) Operator's manual of Eicher 368 USJ tractor.
 - b) Parts catalogue of Eicher 368 USJ tractor.
 - c) Service manual of Eicher 368 USJ tractor.
- 14.6.2** The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

TESTING AUTHORITY:

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

Draft test report is compiled by: Shwetabh Singh, Agricultural Engineer.

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15. APPLICANT'S COMMENT

Para No.	Our Reference	Applicant's comment
15.1	14.3.1.1, 14.3.1.2, 14.3.1.3, 14.3.1.4, 14.3.1.5 & 14.3.2	Recommendations are being looked into w.r.t. Design, development & implementation.
15.2	14.5 (i), (ii), (iii), (iv), (v), (vi), (vii) & (viii)	

ANNEXURE- I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running-in	53.0
2.	PTO performance test	12.0
3.	Drawbar performance test	18.1
4.	Power lift and hydraulic pump performance test	4.0
5.	Brake test	1.5
6.	Noise measurement	1.5
7.	Air Cleaner oil pullover test	3.5
8.	Mechanical vibration test	0.8
9.	Nominal speed test	0.8
B.	HAULAGE TEST	5.0
C.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test.	2.3
TOTAL:		102.5