

(यह परीक्षण रिपोर्ट 30/06/2025 तक वैध है। / THIS TEST REPORT IS VALID UP TO : 30/06/2025)



ACE, FORMA DI 450 ★ TRACTOR



सत्यमेव जयते

भारत सरकार

कृषि एवं किसान कल्याण मंत्रालय
कृषि, सहकारिता एवं किसान कल्याण विभाग
मशीनीकरण एवं प्रौद्योगिकी प्रभाग

GOVERNMENT OF INDIA

MINISTRY OF AGRICULTURE AND FARMERS WELFARE

(Department of Agriculture, Cooperation & Farmers Welfare, Mechanization & Technology Division)

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान

ट्रैक्टर नगर, बुदनी (म.प्र.) ४६६ ४४५

CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE

(An ISO : 9001 - 2015 Certified Institute)

Tractor Nagar, Budni (M.P.) 466 445

E-mail fmti-mp@nic.in

Website : <http://www.fmttibudni.gov.in>

Telephone : 07564 - 234729, 234743



T- 1444/1971/2020

ACE, FORMA DI 450★ TRACTOR - Commercial (1st Batch)

THIS TEST REPORT IS VALID UPTO: 30/06/2025

The "ACE FORMA DI 450★" tractor model had undergone "Initial Commercial Test" at this Institute vide test report No. T- 974/1498/2015 released in June, 2015. Now the applicant has submitted an application vide letter No. 450 ★/00 dated: 16.10.2018 for batch testing of "ACE FORMA DI 450★" tractor.

Thereafter, applicant has submitted revised application vide letter no. 450★ /00, dated: 28.11.2019 to meet the requirement as per IS:12207-2019. The manufacturer has informed that modified parameter i.e. labeling plate and re-declaration of hydraulic lift capacity at lower hitch point shall be implemented from tractor chassis number and engine serial number TAJ450036044 and 3H.2125/1920368 respectively.

All necessary tests as per Table-1 of clause 6.0 of IS: 5994 - 1998 (Reaffirmed in 2014) were carried out and test report released as under.

Manufacturer	: M/s. Action Construction Equipment Ltd. Plant-II, Dudhola Link Road, Dudhola Distt.-Palwal, Haryana - 121 102
Test requested by (applicant)	: M/s. Action Construction Equipment Ltd., 25 th Mile Stone, Jajru Road, Mathura Road, Ballabgarh, Faridabad, Haryana - 121 004
Selected for test by	: The testing authority
Place of running-in	: At manufacturer's work place
Duration of said running-in, (h):	
- Engine	: 25
- Transmission	: 25
Method of Selection	: The test sample was selected randomly out of Five tractors from the production line by the representative of testing authority.

Details of tractors made available for random selection :

Sr. No.	Chassis Number
i)	TAJ450036045
ii)	TAJ450036042
iii)	TAJ450036044
iv)	TAJ450036046
v)	TAJ450036043

1. SPECIFICATIONS

1.1 Tractor:	
Make	: ACE
Model	: FORMA DI 450★
Brand Name	: None
Variants, if any	: None
Type	: Four wheeled, Rear wheel driven, Unit Construction, Agricultural tractor.
Month & Year of manufacture	: 08/19
Chassis number	: TAJ450036044
Country of origin	: India
1.2 Engine:	
Make	: Kirloskar Oil Engines Ltd.
Model	: 3R1040 NA1
Type	: Four stroke, Liquid cooled, Naturally aspirated, Direct injection, Diesel engine.
Serial number	: 3H.2125/1920368

Previous SamplePresent Sample**13.5 Adequacy of literature:**

Following literature of tractor model was supplied with the test sample for reference during the test.

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> i) Operator's manual ACE FORMA DI 450★, tractor ii) Spare parts catalogue ACE FORMA DI 450★ tractor iii) Service Manual ACE FORMA DI 450★ tractor. | | <ul style="list-style-type: none"> i) Operator's manual of ACE FORMA DI 450★ & DI 550★ tractor models ii) Parts catalogue of ACE FORMA DI 450★ & DI 550★ tractor models. iii) Service Manual of ACE FORMA DI 450★ & DI 550★ tractor models |
|--|--|---|

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-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 (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.	31.0 (D)	31.1	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	31.0 (D)	31.1	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	250 (D)	245	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	$\pm 8\%$	175 (D)	189.6	Yes
e)	Back-up torque, percent	Evaluative	12 percent, min.	19 % (D) 12 % (R)	27.8	Yes



T- 1444/1971/2020	ACE, FORMA DI 450★ TRACTOR - Commercial (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 30/06/2025

1	2	3	4	5	6	7	
f)	Maximum operating temperature(°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.	135 (D)	112	Yes
	2)	Coolant (liquid)	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.	118 (D)	101	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.46 (Maximum) (R)	0.32	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 (Maximum) (R)	0.16	Yes	
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	18.00 (D)	21.30	Yes	
				19.6 (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	14.3 (D)	16.64	Yes	
				13.52 (Minimum) (R)			
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.	24.8 (D)	25.8	Yes	
				24.9 Minimum (R)			
d)	Maximum transmission oil temperature (°C)	Evaluative	The declared value should not exceed the maximum value specified by oil company	135 (D)	86	Yes	



1	2	3	4	5	6	7
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	10.8 (D)	10.13	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	7.50 (D)	9.45	Yes
				7.32 Minimum (R)		
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)	145	No
				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 unballast, (m):					
	1) Cold brake	Evaluative	10	10 (R)	9.22	Yes
	2) Hot brake	Evaluative	10	10 (R)	9.24	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)	Evaluative	600	600 (R)	504 to 536	Yes
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever, N	Evaluative	Yes / No	Yes (R)	502	Yes
14.1.5	Noise measurement :					
a)	Maximum ambient noise emitted by the tractor dB(A)	Evaluative	As per CMVR	88 (R)	82	Yes
b)	Maximum noise at operator's ear level dB(A)	Evaluative	As per CMVR	96 (R)	92	Yes
14.1.6	Amplitude of mechanical vibrations at :					
	1) Left foot rest	Non Evaluative	100 microns (max)	100(R)	75	Yes
	2) Right foot rest		-do-		125	No
	3) Seat (with driver seated)		-do-		56	Yes
	4) Steering wheel		do-		107	No
14.1.7	Air cleaner oil pull over:					
	Maximum air cleaner oil pull over	Evaluative	0.25 % (max.)	Dry type air cleaner is provided	Not applicable	
14.1.8	Haulage requirements:					
a)	Gross mass of the trailers, (tonnes):					
	1) Two wheel	Non	--	5.0 (D)	5.0	Yes
	2) Four wheel	Evaluative	--	6.0(D)	6.0	Yes



T- 1444/1971/2020	ACE, FORMA DI 450★ TRACTOR - Commercial (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 30/06/2025

1	2	3	4	5	6	7	
b)	Distance travelled / litre of fuel consumption, (km/l):						
	1)	Two wheel	Non Evaluative	--	4.0 to 6.0 (D)	6.67 to 6.73	Yes
	2)	Four wheel		--	3.5 to 5.5 (D)	6.62 to 6.78	Yes
c)	Fuel consumption (ml/km/tonne):						
	1)	Two wheel	Non Evaluative	--	35 to 55 (D)	29.7 to 30.0	Yes
	2)	Four wheel		--	30 to 50 (D)	24.6 to 25.2	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 initial commercial test of this tractor model tested vide test report No. T-974/1498/2015 released in June, 2015	Yes
	1)	Clutch assembly	-do-				
	2)	Brake housings	-do-				
	3)	Front axle hubs	-do-				
	4)	Engine Oil	-do-				
	5)	Transmission Oil	-do-				
14.1.10	Safety features :						
a)	Guards against moving and hot parts	Evaluative	Belt drives, pullies, 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)	Meet the requirements	Yes		
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		



1	2	3	4	5	6	7	
h)	1)	Maximum travelling speed at rated engine speed in reverse gears, kmph	Evaluative	Should not exceed 20 kmph	12.08 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 shall be activated.	Not fitted	Not applicable	
14.1.11 Labelling of tractors (Provision of labelling plate):							
	1)	Make	Evaluative	Should conform to the requirements of CMVR along with maximum declared value of PTO power in kW and for month & 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	ACE	Yes	
	2)	Model	Evaluative		FORMA DI 450★	Yes	
	3)	Month & Year of manufacture	Evaluative		08 / 19	Yes	
	4)	Engine number	Evaluative		3H.2125/1920368	Yes	
	5)	Chassis number	Evaluative		TAJ450036044	Yes	
	6)	Declaration of PTO power, kW	Evaluative		31.0	Yes	
14.1.12 Discard limit for:							
(a)	Cylinder bore diameter, (mm)	Evaluative	To be specified by Manufacturer	105.3 (D)	105.000 to 105.014	Yes	
(b)	Clearance between piston & cylinder liner at skirt, (mm)	Non Evaluative		0.45 (D)	0.140 to 0.143	Yes	
(c)	Piston diameter at skirt, mm	Non Evaluative		Not specified	104.870 to 104.874	--	
(d)	Ring end gap (mm):						
	-	Top comp. ring.	Evaluative	-do-	2.0 (D)	0.35	Yes
	-	2 nd comp. ring.		-do-	2.0 (D)	0.40	Yes
	-	Oil ring.		-do-	2.0 (D)	0.35 to 0.40	Yes
(e)	Ring groove clearance (mm):						
	-	Top comp. ring.	Evaluative	-do-	--	--Tapered--	Not applicable
	-	2 nd comp. ring.		-do-	0.20 (D)	0.055	Yes
	-	Oil ring.		-do-	0.20 (D)	0.054	Yes
(f)	Diametrical clearance of main bearings (mm):		Evaluative	-do-	0.40 (D)	0.077 to 0.097	Yes
(g)	Clearance of big end bearings, (mm):						
	-	Diametrical	Evaluative	-do-	0.60 (D)	0.079 to 0.090	Yes
	-	Axial	Evaluative	-do-	1.00 (D)	0.33 to 0.38	Yes



T- 1444/1971/2020	ACE, FORMA DI 450★ TRACTOR - Commercial (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 30/06/2025

1	2	3	4	5	6	7
(h)	Crankshaft end float, mm	Evaluative	-do-	0.80 (D)	0.23	Yes
(j)	Clearance between king pin and bush,(mm)	Non Evaluative	-do-	1.00 (D)	0.11	Yes
(k)	Clearance between center pin and bush,(mm)	Non Evaluative	-do-	1.00 (D)	0.14 to 0.16	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	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 **31.1 kW** against the declaration of **31.0 kW**, which meets the requirement of IS: 12207-2019 with regard to tolerance limit.
 - ii) The specific fuel consumption corresponding to maximum power was recorded as **245 g/kWh** against the declaration of **250g/kWh**, which is within the tolerance limit of IS: 12207-2019.
 - iii) The maximum equivalent crankshaft torque was recorded as **189.6 N-m** against the declaration of **175 N-m**, which is within the permissible limit as specified in IS: 12207-2019.
 - iv) The backup torque is **27.8 %** and meets the evaluative requirement of IS: 12207-2019.
 - v) The drop in maximum PTO Power of **5.1%** was recorded between natural and high ambient condition, which is on higher side. Therefore, this should be looked into for necessary corrective action.
- 14.3.1.2 Hydraulic performance test:**
- i) The maximum tilt angle of mast from vertical over the full range of lift with coupled frame was observed as **8.3 degree** against the minimum requirement of **10 degree** as per IS:12224-1987 (Reaffirmed 2014). This should be looked into for necessary corrective action while designing three point linkages.
 - ii) The maximum cumulative drop in height of lift during lift load maintenance test with coupled frame after 30 minute was recorded as **145 mm** against the maximum requirement of **50 mm**. Which does not meet the requirement of IS: 12207-2019. It shows heavy internal leakage of hydraulic oil. This should be looked into for necessary corrective action at production level.
- 14.3.1.3 Mechanical Vibration:**
The amplitude of mechanical vibration on various assemblies / components 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 and steering control to improve the operational comfort and service life of components.
- 14.3.1.4 Three point linkage:**
- i) The dimension "Lateral distance from lower hitch point to centre line of tractor" does not meet the requirement of IS: 4468 (Part I) – 1997 (Reaffirmed in October, 2017). This is recommended to look 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.
- 14.3.1.5 Components / Assembly Inspection**
Discard limit of piston has not been specified in the specifications submitted by applicant. This should be look into for necessary corrective action.
- 14.4 Maintenance / Service Problems:**
No noticeable maintenance / service problem was observed during the test.
- 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
 - ii) There should be provision for safety against the accidental start
 - iii) Vertical retainer should be provided on both side of clutch pedal.



T- 1444/1971/2020	ACE, FORMA DI 450★ TRACTOR - Commercial (1st Batch)
	THIS TEST REPORT IS VALID UPTO: 30/06/2025

- iv) Provision of differential lock.
- v) The working clearance position and draft control lever should be provided as per relevant standard.

14.6 Adequacy of Literature supplied with machine:

14.6.1 Following literature was supplied with the tractor for reference during the test.

- a) Operator's manual of ACE FORMA DI 450★ & DI 550★ tractor models
- b) Parts catalogue of ACE FORMA DI 450★ & DI 550★ tractor models.
- c) Service Manual of ACE FORMA DI 450★ & DI 550★ tractor models

14.6.2 The supplied literature was found adequate; **except the following**

- a) Service schedule and maintenance period of transmission system provided on operator's manual does not match with the specifications submitted by the applicant.
- b) Tractor is fitted with Pad type clutch plate for PTO shaft but circular plate type is mentioned in the Part catalogue submitted by the applicant

14.6.3 The literatures should also be brought out in national as well as other regional languages for the guidance of users and service personnel.

15. Citizen charter

Time frame for testing & evaluation as per citizen charter	Duration of Test	Whether the report released within time frame given in the citizen charter	Remark
10 Months	05 Months (January, 2020 to May, 2020)	Yes	---

TESTING AUTHORITY:

RAJNEESH PATEL
AGRICULTURAL ENGINEER

C.V. CHIMOTE
TEST ENGINEER

J.J.R. NARWARE
DIRECTOR

Test Report compiled by **Shri. Pratyush Satya**, Senior Technical Assistant

16. APPLICANT'S COMMENTS

Para No.	Our Reference	Applicant's comments
16.1	14.3.1.1 (v), 14.3.1.2, 14.3.1.3, 14.3.1.4 & 14.3.1.5	Your valuable comments & suggestions for improvements are well taken and these aspects are further being looked into & will try to eliminate these deviations soon wherever necessary

**ANNEXURE - I****TRACTOR RUN HOURS DURING TEST**

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running-in	50.00
2.	PTO Performance test	10.75
3.	Power lift and hydraulic pump performance test	2.75
4.	Drawbar performance test	17.46
5.	Brake test	1.00
6.	Noise measurement	1.00
7.	Mechanical vibration test	0.75
8.	Nominal speed test	1.50
B.	HAULAGE TEST	4.81
C.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	1.55
TOTAL:		91.57