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

संख्या / No. : T-1093/1618/2017
माह / Month : June, 2017



ACE DI 47 XT 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

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T-1093/1618/2017

ACE DI 47 XT TRACTOR - COMMERCIAL (Variant)

Manufacturer : M/s. Action Construction Equipment Limited,
Dudholla Link Road,
Village : Dudholla, Palwal,
Distt. Palwal (Haryana) – 121 102

Applicant : M/s. Action Construction Equipment Limited,
25th Mile Stone, Jajru Road, Mathura Road,
Ballabgarh, Faridabad (Haryana) – 121 004

Month: June	Test Report No. T-1093/1618/2017	Year : 2017
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Type of Test : COMMERCIAL (Variant)
 Test code/Procedure : IS: 5994-1998 (Reaffirmed in 2009)
 and IS: 12207-2014.
 Period of Test : February, 2017 to April, 2017
 Test Report No. : T-1093/1618/2017
 Month/Year : June, 2017

- i) The results reported in this report are observed values and no corrections have been applied for atmospheric and site conditions.
- ii) The data given in this report pertain to the particular machine submitted by the applicant for test.
- iii) The results presented in this report do not in any way attribute to the durability of the machine.
- iv) This report should not be reproduced in part or full without prior permission of the Director, Central Farm Machinery Training and Testing Institute, Budni (M.P.).
- v) This is a Variant test report and therefore, should be read in conjunction with the Test Report of base model i.e. "ACE DI 450 NG" tractor bearing No. T- 941/1459/2014 (October, 2014).

SELECTED CONVERSIONS

Sl. No	Units	Conversion Factor	ABBREVIATIONS	
1.	Force:		Apa	As per applicant
	1 kgf	9.80665 N	TDC	Top Dead Centre
		2.20462 lbf	IS	Indian Standard
2.	Power:		LHS/RHS	Left Hand Side/ Right Hand Side
	1 hp	1.01387 metric hp (Ps)	Hg	Mercury
		745.7 W	Temp.	Temperature
	1 Ps	735.5 W	N.R.	Not recorded
	1 kW	1.35962 Ps	Rpm	Revolutions per minute
3.	Pressure:		O.D/I.D	Outer diameter/ Inner diameter
	1 psi	6.895 kPa	N.A.	Not available/ Not applicable
	1 kgf/cm ²	98.067 kPa = 735.56 mm of Hg	PTO	Power take-off
	1 bar	100 kPa = 10 N/cm ²	R.H.	Relative Humidity
	1 mm of Hg	1.3332 m-bar		



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Manufacturer	:	M/s. Action Construction Equipment Limited, Dudholla Link Road, Village: Dudholla, Palwal, Distt. Palwal (Haryana) – 121 102
Test requested by (applicant)	:	M/s. Action Construction Equipment Limited, 25 th Mile Stone, Jajru Road, Mathura Road, Ballabgarh, Faridabad (Haryana) – 121 004
Place of running-in	:	At Applicant's works
Duration of said running-in, (h):		
- Engine	:	25
- Transmission	:	25
Method of Selection	:	The tractor was submitted directly by the applicant for test. Hence, method of selection is not known.

1. SCOPE OF TEST

The "ACE DI 450 NG" tractor had undergone initial commercial testing at this Institute and test report bearing No. T-941/1459/2014 was released in October, 2014. Now, the applicant has submitted an application vide letter No. 47 XT/001 dated 05.11.2016 for testing of "ACE DI 47 XT" tractor as a variant of "ACE DI 450 NG" tractor.

The applicant having enclosed a list of following differences in the technical specifications between tractor models "ACE DI 450 NG" and "ACE DI 47 XT" and requested to test the "ACE DI 47 XT" as a variant of "ACE DI 450 NG" tractor :-

S. No.	Particulars	Base model	Present sample
1	2	3	4
1.	Model of tractor	ACE DI 450 NG	ACE DI 47 XT
2.	Capacity of fuel tank, (l)	59.8	55.0
3.	Bare radiator capacity, (l)	6.20	5.70
4.	Coolant expansion tank capacity,(l)	1.10	1.05
5.	Total coolant capacity, (l)	11.80	11.10
6.	Reduction through final drive	4.462 : 1 (58/13T)	4.833 : 1 (58/12T)
7.	Make of hydraulic pump	Windsor (apa)	Rexroth (apa)
8.	Ram cylinder & piston (Dimension)	Refer Annexure-I	Refer Annexure-II
9.	Declared lifting capacity at lower hitch point & standard frame, (kN)	9.53 & 8.68	14.71 & 11.87
10.	Brake system:		
11.	Type	Mechanical ,dry disc brake	Mechanical, Oil immersed disc brake
	No of disc	Two (on each wheel side)	Four (on each wheel side)
	Area of brake liner, (cm ²)	740.7 (on each wheel side)	913.3 (on each wheel side)

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1	2	3	4
12.	Range of speeds (kmph): - Forward	2.52 to 31.93	2.37 to 30.92 (Variation of -6.0 to -2.6 %)
	- Reverse	3.52 to 13.87	3.31 to 13.04 (Variation of -6.0 %)
13.	Location of gear shifting levers	In-front of operator's seat	In RHS (main shifting lever) & LHS (range shifting lever) of operator's seat
14.	Make & model of self starter	Magneton & Not available	Panalfa & Not available
15.	Make & model of generator	Magneton & AS0071812 G	Panalfa & Not available
16.	Output rating of generator	12V, 35 Amps	12V, 42 Amps
17.	Unballast mass of tractor, (kg), (front/rear/total)	790/1150/1940	790/1215/2005
18.	Type of Steering system	Mechanical, worm and roller with single drop arm	Open centre, Hydrostatic
19.	Rear Tyres: -		
	Size & ply rating	13.6-28, 12PR	14.9-28, 12PR
	Size of wheel rim	W 12 x 28	W 13 x 28
20.	Wheel base, (mm)	1970	2010

Subsequent to the examination of the case in light of Indian Standard IS 12207-2014, the following tests were considered to be carried out:

- Specification checking in full
- Nominal speed test
- Two hour maximum PTO power test under normal ambient conditions
- Hydraulic performance test
- Brake performance test
- Tiring ability test
- Centre of gravity test

2. FUEL AND LUBRICANTS

- 2.1 Fuel : The High-speed diesel oil supplied by M/s Indian Oil Corporation Limited having density of 0.836 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 oil	20W40	As recommended
2.	Transmission, differential, final drive and hydraulic system oil	HP Super Tran (E)	Oil originally filled in the tractor was not changed.
3.	Steering housing oil	HP Super Tran (E)	-do--
4.	Grease	Servo Grease MP	Servo grease MP

3. ESSENTIAL TESTS

3.1. SPECIFICATIONS

	<u>Base Model</u>	<u>Variant Model</u>
3.1.1 Tractor:		
Make	: ACE	ACE
Model	: DI 450 NG	DI 47 XT
Type	: Four wheeled, Rear-wheel driven, Standard Agricultural Tractor	
Year of manufacture	: M AC (February 2013)	2016
Chassis number	: MAC 450000002	SAF 470025451
Country of Origin	: India	India
3.1.2 Engine:		
Make	: ACE	ACE
Model	: A45	A45
Type	: Four stroke, naturally aspirated, water cooled, direct injection, diesel engine.	
Serial number	: TMAC0000002	TSAF0002722
Engine speed (Manufacturer's recommended production setting), (rpm) :		
- Maximum speed at no load	: 2150 to 2250	2150 to 2250
- Low idle speed	: 650 to 750	650 to 750
- Speed at maximum torque	: 1100 to 1300	1100 to 1300
Rated speed, (rpm):		
- For PTO use	: 2000	2000
- For drawbar use	: 2000	2000
3.1.3 Cylinder & Cylinder Head:		
Number	: Three	Three
Disposition	: Vertical, Inline	Vertical, Inline
Bore/stroke, (mm)	: 105/110 (apa)	105/110 (apa)
Capacity as specified by the applicant, (cc)	: 2857	2857
Compression ratio, (apa)	: 18.5 : 1	18.5 : 1
Type of cylinder head	: Monoblock	Monoblock
Type of cylinder liners	: Wet, replaceable	Wet, replaceable
Type of combustion chamber	: Re entrant type	
Arrangement of valves	: Overhead, inline	Overhead, inline



	<u>Base Model</u>	<u>Variant Model</u>
Valve clearance (cold/hot):		
- Inlet valve, (mm)	: 0.30 / 0.30	0.30 / 0.30
- Exhaust valve, (mm)	: 0.40 / 0.40	0.40 / 0.40
3.1.4 Fuel System:		
Type of fuel feed system	: Gravity and force feed	
3.1.4.1 Fuel tank:		
Capacity, (l)	: 59.8	55.0
Location	: Above flywheel housing.	
Provision for draining of sediments/ water	: Not provided	Provided
Material of fuel tank	: Metallic	Metallic
3.1.4.2 Water separator :		
Make	: Hilux	Hilux
Type	: Inverted funnel, gravity separation	Inverted funnel, gravity separation
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.
Capacity (l)	0.50	0.50
3.1.4.3 Fuel feed pump:		
Type	: Bosch	Bosch
Make	: Plunger	Plunger
Model/Group combination No.	: FP/KS22A62, 9440 030 029	FP/KS22A62, 9440 030 029
Provision of sediment bowl	: Provided (metallic)	Provided (metallic)
Method of drive	: Through cam shaft of fuel injection pump	Through cam shaft of fuel injection pump
3.1.4.4 Fuel filters:		
Make	: Bosch	Bosch
Model/Group combination No.	: 9 450 030 118	9 450 030 118
Number	: Two	Two
Type of elements:		
- Primary	: Cloth	Cloth
- Secondary	: Paper	Paper
Capacity of final stage filter, (l)	: 0.45	0.45
3.1.4.5 Fuel Injection pump:		
Make	: Bosch India	Bosch India
Model/Group combination No.	: E 040 266 800	F 002 AOZ 949
Type	: Plunger, Inline	Plunger, Inline
Serial number	: 110001	61963373
Method of drive	: Through timing gears	
3.1.4.6 Fuel injectors:		
Make	: Bosch	Bosch
Nozzle holder Number	: F 002 C70 552	F 002 C70 552
Nozzle Number	: DSLA 140 PV3 391673	DSLA 140 PV3 391673
Type	: Multiholes (five holes)	Multiholes (five holes)
Manufacturer's production pressure setting, (MPa)	: 25.0 to 25.8	25.0 to 25.8



	<u>Base Model</u>	<u>Variant Model</u>
Injection timing	: 11 ± 1 degree before TDC	11 ± 1 degree before TDC
Firing order	: 1-3-2	1-3-2
3.1.4.7 Governor:		
Make	: Bosch	Bosch
Model/Group combination No.	: E 042 207 400	RSV350...1000A5C1734R
Type	: Mechanical, centrifugal, variable speed	Mechanical, centrifugal, variable speed
Governed range of engine speed, (rpm)	: 650 to 2250	650 to 2250
Rated engine speed, (rpm)	: 2000	2000
3.1.5 Air Intake system:		
3.1.5.1 Pre-cleaner:		Not provided
3.1.5.2 Air cleaner:		
Make	:	Donaldson
Type	:	Dry
Location	:	In front of radiator, under the bonnet
Range of suction pressure at maximum power, (kPa)	: 2.1 to 2.3	3.2 to 3.3
Details of elements:		
- Size (OD/ID), (mm)	: <u>Secondary element</u> 71.7 /70.1	<u>Primary element</u> 122.9 /97.1
- Length, (mm)	: 300	310
- Type	: Polyester felt	Cellulose fiber paper
- No. of elements	: One	One
Air flow restriction indicator	: Provided on dash board	
Dust unloading valve	: Provided	
Maintenance schedule	: i) Cleaning of primary element if required in arduous condition or after every 300 hours of operation. ii) Replace primary element after every 900 hours of operation or after 3 cleanings of primary filter element. iii) Replace secondary element after every 2700 hours or after 3 replacement of primary filter element.	
3.1.6 Exhaust System:		
Type of silencer	: Updraft (elliptical)	Updraft (elliptical)
Position of silencer outlet with respect to SIP, (mm):		
- Vertical	: 960	835
- Longitudinal	: 1440	1525
- Lateral	: 500 (on RHS)	530 (on RHS)
Range of exhaust gas pressure at maximum power, (kPa)	: 8.4 to 8.5	4.3 to 5.9
Provision of spark arresting device	: None	None
Provision against entry of rain water	: A bend is provided at the end of the silencer	



		<u>Base Model</u>	<u>Variant Model</u>
3.1.7	Lubricating system:		
	Type	Forced feed-cum-splash	
	Oil sump capacity, (l)	6.90	5.50
	Total lub oil capacity, (l)	7.50	6.55
	Oil change period	First change after 50 hours and subsequently after every 250 hours of operation.	
	Cooling device, (if any)	None	
	Filters:		
	Make	Mico	TV Super filter
	Type	Full flow, spin-on, replaceable paper element	
	Number	One	One
	Pump:		
	Make	Viraj automotive/United gear (apa)	
	Type	Gear	
	Method of drive	Through timing gears	
	Pressure release setting, (kPa)	450	
	Minimum permissible pressure, (kPa)	49	
3.1.8	Cooling system:		
	Type	Forced circulation of coolant	
	Name & brand name of coolant	Pee kay international	
	Coolant water ratio	10:1	
	Details of pump	Centrifugal, semi open impeller having 12 vanes of 89 mm diameter and driven through crankshaft pulley by a "V" belt common to alternator.	
	Details of fan	Suction type having 07 polypropylene blades of 430 mm diameter and mounted on water pump shaft.	
	Means of temperature control	Thermostat	
	Bare radiator capacity, (l)	6.20	5.70
	Coolant expansion tank capacity(l)	1.10	1.05
	Total coolant capacity, (l)	11.80	11.10
	Radiator cap pressure, (kPa)	88	88
3.1.9	Starting System:		
	Type	12V, DC, Electrical	
	Aid for cold starting	None	None
	Any other device provided for easy starting.	None	None
3.1.10	Electrical System:		
3.1.10.1	Battery:		
	Make & Model	AMRON TRA550D31R	& Exide express & MHD 880
	Number	One	One
	Type	Lead acid	Lead acid
	Capacity and rating	12V, 88 Ah at 20 hours discharge rate	
	Location	In front of radiator, under the bonnet	



3.1.10.2 Starter:	Base Model	Variant Model
Make	: Magneton	Panalfa
Model	: Not available	Not available
Type	: Pre-engaging, solenoid operated	
Capacity and rating	: 12V, 2.5 kW	12V, 2.5 kW
Serial number	: Not available	Not available
3.1.10.3 Generator:		
Make	: Magneton	Panalfa
Model	: AS 007 1812 G	Not available
Type	: Alternator	Alternator,
Output rating	: 12V, 35 Amps	12V, 42 Amps
Serial number	: Not available	Not available
Method of drive	: Through crankshaft pulley by a cogged "V" belt.	
3.1.10.4 Voltage regulator	: In-built in alternator	

3.1.10.5 Details of lights:

Description	No. & capacity of bulbs	Height of the centre of beam above ground level,(mm)	Size of beam, (mm)	Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm)
1	2	3	4	5
A) Base Model:				
Front Lights:				
- Head lights	2,12V,60/55W	1225	160 x 100	712
- Parking lights	2, 12V, 5W	1320	65 x 65	178
-Turn-cum-Hazard indicators	2, 12V,21W	1320	65 x 70	110
- Reflectors (White)	2	1320	55 x 30	228
Rear lights:				
-Parking light /Stop light	2, 12V, 21/5W	1325	65 x 65	185
- Turn Indicators/ Hazard lights	2, 12V,21W	1325	65 x 70	118
Plough light (on RHS mudguard)	1, 12V, 55 W	1460	125 ϕ	335
Registration plate Light	2	1325	30 x 55	232
Reflectors (Red)	Part of the rear tail light			
B) Variant Model:				
Front Lights:				
- Head lights	2,12V,60/55W	1225	160 x 100	713
- Parking lights	2, 12V, 5W	1350	65 x 65	180
- Turn-cum-hazard Indicators	2, 12V,21W	1350	65 x 70	110
- Reflectors (White)	2	1350	55 x 30	230
Rear lights:				
-Tail -cum-brake lights	2, 12V, 21/5W	1350	65 x 65	650
- Turn-cum-Hazard Indicators	2, 12V,21W	1350	65 x 70	120



1	2	3	4	5
Plough light (on RHS mudguard)	1, 12V, 55 W	1510	120 ϕ	590
Reflectors (Red)	2	1350	30 x 55	270
Registration plate Light	Part of the rear tail light			

3.1.11 Instrument panel details:

	Base model	Variant model
i) Engine speed- cum- digital cumulative run hour meter (0 - 30 x 100 rpm)	Provided	Provided
ii) Coolant (water) temperature gauge (with colour zones)	Provided	Provided
iii) Voltmeter (with colour zones)	Provided	Provided
iv) Lubricant oil pressure gauge (with colour zones)	Provided	Provided
v) Fuel level gauge (with colour zones)	Provided	Provided
vi) Air cleaner clogging indicator light	Provided	Provided
vii) Main switch (key-turn type)	Provided	Provided
viii) Light switch (rotary type)	Provided	Provided
ix) Turn indicator light switch.	Provided	Provided
x) Head light (long beam) indicator lamp	Provided	Provided
xi) Battery charging indicator lamp	Provided	Provided
xii) Turn indicator-cum-hazard indicator lamp	Provided	Provided
xiii) Hazard light switch	Provided	Provided
xiv) Mobile charger socket	Provided	Provided
xv) Fuel shut-off knob	Provided	Provided
xvi) Steering control wheel	Provided	Provided
xvii) Hand accelerator	Provided	Provided

3.1.12 Transmission System:

3.1.12.1 Clutch:

	Base Model	Variant Model
Make	Luk	Luk
Type	Dry , dual friction plates	
No. of friction plate, (s)	Two	Two
Size (OD/ID):		
- Transmission	280 /165 ϕ	280 /165 ϕ
- PTO	280/165 ϕ	280/165 ϕ
Method of operation:		
- Transmission	By depressing the pedal on LHS, half way	
- PTO	By depressing the same pedal fully.	

3.1.12.2 Gear box:

Make	ACE	ACE
Type	Mechanical, combination of constant and sliding mesh gear with epicyclic gear reduction unit for HI-low gear selection.	
Location of gear shifting levers	In-front of operator's seat.	Gear shifting lever is on RHS of the operator's seat & range shifting lever is on LHS of the operator's seat.



	<u>Base Model</u>	<u>Variant Model</u>
Gear shifting pattern		
	<u>Gear selection lever</u>	<u>Range selection lever</u>
No. of speeds:		
- Forward	: 08	08
- Reverse	: 02	02
Range speeds (kmph):		
- Forwards	: 2.52 to 31.93	2.37 to 30.92
- Reverse	: 3.52 to 13.87	3.31 to 13.04
Oil capacity, (l)	: 54.0 (Common with differential, hydraulic rear axle & final drive)	50.0 (Common with differential rear axle, final drive, brakes and hydraulic system)
Oil changing period	: First change after 750 hours of operation subsequently changes after every 1000 hours of operation.	
3.1.12.3 Differential unit:		
Type	: Crown wheel & bevel pinion with differential unit accommodated inside the differential housing.	
Reduction through crown wheel and bevel pinion	: 3.23 : 1 (42/13 T)	
Differential lock:	Not Provided	Not Provided
3.1.12.4 Rear axle & final drive:		
Type	: Bull and pinion gear reduction unit accommodated inside differential housing.	
Reduction through final drive	: 4.462 : 1 (58/13T)	4.433 : 1 (58/12T)
Oil capacity, (l)	: 54.0 (Common, with transmission, hydraulic & final drive)	50.0 (Common with gear box, brakes, and hydraulic system)
Oil changing period	: First change after 750 hours of operation subsequently changes after every 1000 hours of operation.	
3.1.13 Power lift (Hydraulic System):		
Make	: ACE	
Type	: Open center, live, ADDC	
No. and type of cylinder	: One, single acting	
Type of linkage lock for transport	: Hydraulic, response control valve in fully closed position act as a transport lock.	
3.1.13.1 Hydraulic pump:		
- Make	: Windsor (apa)	Rexroth (apa)
- Type	: Gear	
- Location & drive	: On RHS of engine & through timing gears	
No. & type of filters	: Three, two fine wire mesh strainer and one spin-on throw away type filter.	



	<u>Base Model</u>	<u>Variant Model</u>
Hydraulic oil capacity, (l)	: 54.0 (common with gear box , differential & rear final drive)	50.0 (Common with gear box, brakes, rear axle & final drive.)
Oil change period	: First change after 750 hours of operation subsequently changes after every 1000 hours of operation.	
Provision for external tapping	: Provided	Provided
Details of control levers	: i) Position control lever. ii) Draft control lever. iii) Response control knob (at distributor)	
Method of draft sensing	: Through top link	Through top link

3.1.13.2 Three point linkage:

S. No.	Observations	As per IS: 4468- (Part-1) -1997, (Cat.I / Cat.II), (mm)	As measured (mm)		Remarks in case of variant model
			Base model	Variant model	
1	2	3	4	5	6
I.	Upper hitch points:				
	a) Dia of hitch pin hole	19.30 to 19.50 / 25.70 to 25.90	25.73	25.76	Conforms to Cat-II
	b) Width of ball	44.0 (max.) / 51.0 (max)	50.81	51.00	-do-
II.	Lower hitch points:				
	a) Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.00	28.90	29.00	-do-
	b) Width of ball	34.80 to 35.00 / 44.80 to 45.00	44.96	44.90	-do-
III.	Lateral distance from lower hitch point to centre line of tractor.	359 / 435	365	364	Does not conform
IV.	Lateral movement of lower hitch points	100 (min) / 125 (min)	165	240	Conforms to Cat. I & II
V.	Distance from end of power take-off to centre of lower hitch point (lower links in horizontal position)	450 to 575 / 550 to 625	520	515	Conforms to Cat. I
VI.	Transport height	820 (min)/ 950 (min)	825	900	-do-
VII.	Power range (without force)	560 (min)/ 650 (min)	630	625	-do-
VIII.	Leveling adjustment	100 (min)/ 100 (min)	300	265	Conforms to Cat. I & II
IX.	Lower hitch point clearance	100 (min)/ 100 (min)	220	210	-do-
X.	Lower hitch point height	200 (max) / 200 (max)	165	200	-do-

3.1.13.3 Linkage geometry dimensions [Refer Fig.-1(a)]:

The following are dimensions observed, corresponding to 640 mm as tyre dynamic radius index:

S. No.	Parameter	Notation	Dimension or range, (mm)	Setting used during test, (mm)
1	2	3	4	5
1.	Length of lower link	A	780	780
2.	Length of lift arm	B	240	240
3.	Length of lift rods	C	650 to 711	690
4.	Length of top link	D	505 to 720	530
5.	Distance of lift rod connection point from pivot point of lower link.	E	390 & 450	450
6.	Distance of lower link pivot point from rear wheel axis:			
	-Horizontally	F	100, behind	100, behind
	-Vertically	G	150, below	150, below
7.	Distance of upper link pivot point from rear wheel axis:			
	-Horizontally	H	355, 355 & 355, behind	355, behind
	-Vertically	J	265, 295 & 320, above	295, above
8.	Distance of lift arm pivot point from rear wheel axis:			
	-Horizontally	K	65, forward	65, forward
	-Vertically	L	370, above	370, above
9.	Height of lower hitch points relative to the rear wheel axis:			
	- In high position	M	130 to 260	185, above
	- In low position	N	- 605 to - 335	440, below
10.	Height of lower link hitch points when locked in transport position	--	Any height within the lift range.	

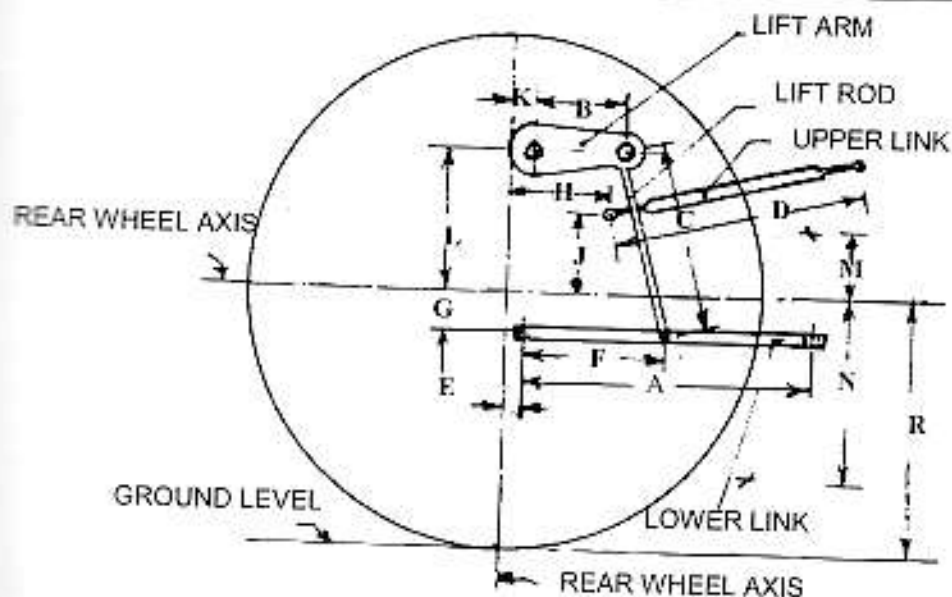


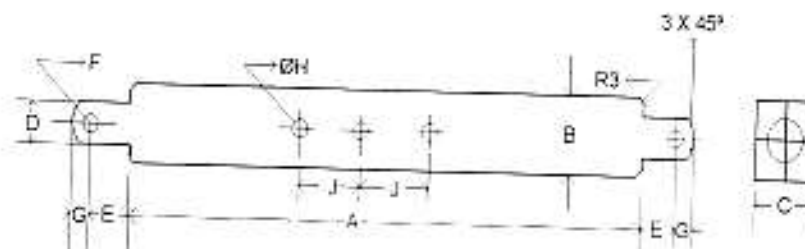
Fig.1 (a): DIMENSIONAL NOTATIONS FOR TABLE OF LINKAGE GEOMETRY



3.1.13.4 Drawbar:

3.1.13.4.1 Linkage Drawbar [Refer Fig. 1 (b)]:

Notation	As per IS: 12953-1995 (Cat. I)/(Cat. II), (mm)	As measured, (mm)		Remarks in case of variant model
		Base model	Variant model	
A	683 ± 1.5 / 825 ± 1.5	684	683	Conforms to Cat-I
B	75 (min) / 75 (min)	75.0	75.0	Conforms to Cat-I & II
C	30 (min) / 30 (min)	30.2	30.0	-do-
D \emptyset	21.79 to 22.00 / 27.79 to 28.00	28.00	27.90	Conforms to Cat-II
E	39.0 (min) / 49.0 (min)	55.3	54.5	Conforms to Cat-I & II
F \emptyset	12.0 (min) / 12.0 (min)	12.2	12.2	-do-
G	15.0 (min) / 15.0 (min)	16.5	16.4	-do-
H \emptyset	25 ± 1 / 25 ± 1	25.0	25.0	-do-
J	80 ± 1.5 / 80 ± 1.5	80.0	80.0	-do-
No. of holes	7 / 9	7	7	Conforms to Cat-I



1(b): DIMENSIONAL NOTATIONS FOR LINKAGE DRAWBAR

	Base model	Variant model
3.1.13.4.2 Swinging drawbar	: Not Provided	: Not provided
3.1.14 Power take-off shaft:		
Type	:	Type-I, Independent
Method of engaging	:	By a hand lever provided on LHS of operator's seat.
No. of shaft(s)	:	One
PTO speed corresponding to rated engine speed (rpm)	:	612
Distance behind rear axle, (mm)	:	350
Engine to PTO speed ratio	:	3,267 : 1
Whether the PTO shaft is capable of transmitting full power of the engine.	:	Yes
Other speeds, if any	:	Not provided

3.1.14.1 Specifications of Power Take-Off Shaft:

Specification	As per IS: 4931-1995 (Type-I)	As observed		Remarks in case of variant model
		Base model	Variant model	
1	2	3	4	5
Nominal speed, (rpm)	540 ± 10	540 rpm of PTO corresponds to 1764 rpm of engine		Conforms
No. of splines	6	6	6	-do-
Direction of rotation	Clockwise	Clockwise	Clockwise	-do-
Location	The position of the centre of the end of pto shaft shall be within 50mm to right or left of the centre line of the tractor.	Centrally located	In the centre line of the tractor	-do-
Dimensions, (mm) [See Fig.2]:				
D \varnothing	34.79 ± 0.06	34.85	34.81	-do-
d \varnothing	28.91 ± 0.05	28.92	28.86	-do-
B \varnothing	29.4 ± 0.1	29.36	29.42	-do-
A \varnothing (optional)	8.3 ± 0.1	8.45	8.69	-do-
W	8.69 - 0.09 - 0.16	8.57	8.69	-do-
a	7	7	7	-do-
b (optional)	25 ± 0.5	25.5	25.5	-do-
c	38	38	38	-do-
X	30°	30 ^U	30 ^U	-do-
B	76 (min)	87.0	84.7	-do-
h	450 to 675	610	650	-do-

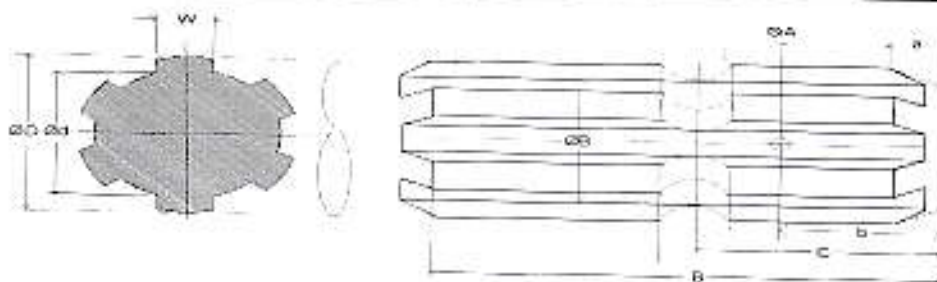


Fig.2. (a): DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

3.1.14.2 Provision of power take-off shaft shield : Base model Not provided | Variant model Provided

Specifications of power take-off shaft shield for type I & II PTO [See Fig. 2(b)]:

Specification	As per IS: 4931-1995	As observed (for variant model)	Remarks
k	70 (min)	70	Conforms
m	125 ± 5	125	-do-
n	85 ± 5	80	-do-
p	285 ± 5	285	-do-
r	76 (max)	0	-do-

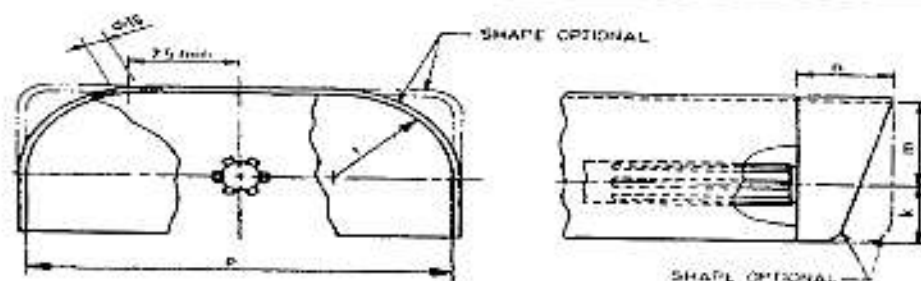


Fig.2. (b): DIMENSIONAL NOTATION OF PTO SHAFT MASTER SHIELD

3.1.15 Towing hitch:		Base model	Variant model
3.1.15.1	Front		
	Type	Clevis	Clevis
	Location	At front axle support bracket	
	Height above ground level, (mm)	620 (fixed)	635 (fixed)
	Dia of pin hole, (mm)	28.3	28.0
	Width of clevis, (mm)	50.9	52.0
3.1.15.2	Rear		
	Type	Clevis	Clevis
	Location	At rear of differential housing	
	Height above ground level, (mm):		
	- Maximum	870	900
	- Minimum	410	620
	- Type of adjustment	By changing the position and reversing and changing of hitch on its mounting bracket.	
	Distance of hitch point, (mm):		
	-From rear wheel centre	430 & 450	395
	-From power take-off shaft end	80 & 100	85
	Dia of pin hole, (mm)	35.1	35.0
	Width of clevis, (mm)	81.9	90.0
3.1.16	Steering:		
	Make	ZF (apa)	Ognibene
	Type	Mechanical, worm and roller with single drop arm	Open centre, Hydrostatic
	Location	Mounted on clutch housing	
	Method of operation	Manual, by steering control wheel	
	Diameter of steering control wheel, (mm)	430	430
	Make & Type of pump	Not applicable	Rexroth & gear pump
	Location & Method of drive	Not applicable	On RHS of engine & driven through timing gears
	Number, Type & Location of hydraulic ram cylinder	Not applicable	One, double acting & In rear of front axle.
	Steering oil capacity, (l)	0.45	2.20
	Lubricant change period	First change after 750 hours of operation subsequently changes after every 1000 hours of operation.	



3.1.17 Brakes:		<u>Base model</u>	<u>Variant model</u>
3.1.17.1	Service Brake:		
	Make	: Vishwas	JMIL
	Type	: Mechanical, dry disc brakes	Mechanical, oil immersed disc brakes
	Location	: On bull-pinion half axle shaft, outside of the differential housing.	
	No. of disc(s)	: Two (on each wheel side)	Four (on each wheel side)
	Area of liners, (cm ²)	: 740.7 (on each wheel side)	913.3 (on each wheel side)
	Material of liners	: Asbestos (apa)	Friction material
	Method of operation	: Mechanical, individual/combined operation by RHS foot pedal.	HY-02-05
3.1.17.2	Parking Brake:		
	Type	: Pawl and ratchet arrangement	
	Location & Method of operation	: Service brake acts as parking brake when locked in position by a hand lever provided on RHS of operator's seat.	
3.1.18	Wheel Equipment:		
3.1.18.1	Steered Wheel (s):		
	Make	: Good Year	MRF
	Number(s)	: Two	Two
	Type of tyre	: Pneumatic, ribbed	Pneumatic, ribbed
	Size	: 6.00-16	6.00-16
	Ply rating	: 8	8
	Maximum permissible loading capacity of each tyre at 230 kPa pressure kN, (kgf)	: 450	450
	Recommended inflation pressure, (kPa) :		
	- For field work	: 230	200
	- For transport	: 230	230
	Track width, (mm)	: 1250 (std.) & 1485	1300 (std) & 1540
	Method of changing track width	: By reversing the wheels	
	Make & size of wheel rim	: SSWL & 4.5 E x 16	SSWL & 4.5 E x 16
3.1.18.2	Drive wheel (s):		
	Make	: Good Year	MRF Shakti
	Number	: Two	Two
	Type of tyre	: Pneumatic, traction	Pneumatic, traction
	Size	: 13.6 - 28	14.9-28
	Ply rating	: 12	12
	Maximum permissible loading capacity of each tyre at 110 kPa pressure, (kgf)	: 1180	1600
	Recommended inflation pressure, (kPa):		
	- For field work	: 110	113
	- For transport	: 113	140
	Standard track width, (mm)	: 1365(std.), 1440, 1540, 1580, 1700, 1780 & 1880	1375, 1435(std.), 1485, 1655, 1715, 1765 & 1815



		<u>Base model</u>	<u>Variant model</u>
	Method of changing track width	: By reversing the wheel discs and by changing the position of wheel disc on offset rim lugs.	
	Make & size of wheel rim	: SSWL & W12 x 28	: CPWL, W13 x 28
3.1.18.3	Wheel base, (mm)	: 1970	: 2010
	Method of changing wheel base, if any, and range	: None	: None
3.1.19	Operator's seat:		
	Make	: Auto fit (apa)	: Auto fit (apa)
	Type	:	: Cushioned
	Type of Suspension	:	: Two Helical coil springs
	Type of Damping	:	: Hydraulic shock absorber
	Range of adjustment, (mm):		
	Vertical	: Nil	: Nil
	Lateral	: Nil	: Nil
	Longitudinal	: ± 80	: ± 90
3.1.20	Provision for safety and comfort of operator:		
3.1.20.1	Operator's Seat:		
	Meets the minimum requirements of IS: 12343-1998, (Re-affirmed in March, 2009).		
3.1.20.2	Conformity with IS: 6283 (Part 1 & 2)-1998 (Re-affirmed in March, 2009) :		
	Controls and displays are identifiable with symbols as per IS: 6283 (Part-1 & 2)-1998.		
3.1.20.3	Conformity with IS : 8133-1983 (Re-affirmed in March, 2009) :		
	Location and movement of various controls meets the requirement of IS : 8133-1983 except the following:		
	<u>Base model</u>	<u>Variant model</u>	
	i) Provision of safety against accidental start of engine has not been provided.	i) Provision of safety against accidental start of engine has not been provided.	
	ii) Fuel shut-off knob does not remain in "STOP" position.	--	
3.1.20.4	Conformity with IS:12239 (Part-1)-1996 (Re-affirmed in March,2007) :		
	Meets the requirements of IS: 12239 (Part-1) – 1996, except the following:		
	<u>Base model</u>	<u>Variant model</u>	
	i) The spark arrester has not been provided in the exhaust system.	i) The spark arrester has not been provided in the exhaust system.	
3.1.20.5	Conformity with IS:12239 (Part-2)-1999 (Re-affirmed in March,2009) :		
	Meets the requirements of IS:12239 (Part-2)-1999, except the following:		
	i) Differential lock is not provided.	i) Differential lock is not provided.	
	ii) PTO shaft master shield is not provided.		
	iii) The working clearance between the position control lever and draft control lever is less than 70 mm.	ii) The working clearance between the position control lever and draft control lever is less than 70 mm.	
3.1.21	Mass of tractor, (kg):	<u>Base model</u>	<u>Variant model</u>
		Without ballast	Without ballast
	- Front	: 790	: 775
	- Rear	: 1150	: 1260
	- Total	: 1940	: 2035



3.1.22	Over all dimensions (mm):	Base model	Variant model
	- Length	: 3545	3780
	- Width	: 1700	1820
	- Height	: 2310	2300
	Minimum ground clearance, (mm)	: 400 (below transmission housing drain plug)	395 (below tie rod)

3.1.23 Labelling of tractor:

The Labelling plate riveted on LHS mudguard, provides the following information:

Name of Manufacturer	:	M/s. Action Construction Equipment Limited, Dhudholla Link Road, Village: Dhudholla, Palwal, Distt. Faridabad-121 102 (HARYANA)
Make	:	ACE
Model	:	DI 47 XT
Year of manufacture	:	2016
Engine serial number	:	SAF470025451
Chassis serial number	:	TSAF0002722
Maximum P.T.O Power, kW	:	31
Specific fuel consumption, g/kWh	:	265

3.1.24	Number of external lubricating points:	Base model	Variant model
	- Oiling	: None	Nil
	- Grease cups	: 02	02
	- Grease nipples	: 19	19

3.1.25 Colour of tractor:

Chassis & engine	:	Black	Black
Bonnet, Mudguard	:	Blue	Blue
Rim & disc	:	Silver gray	Silver gray

3.2 NOMINAL SPEED TEST

Movement	Gear No.	No. of engine revolutions for one revolution of driving wheel		Nominal speed at rated engine speed when fitted with 13.6-28 size tyres 610 mm radius index, (kmph).	Nominal speed at rated engine speed when fitted with 14.9-26 size tyres 640 mm radius index, (kmph).	Variation in nominal speed (%)
		Base model	Variant model	Base model	Variant model	
Forward	L1	182.83	204.02	2.52	2.37	-6.0
	L2	148.65	161.26	3.09	2.99	-3.2
	L3	89.63	97.09	5.13	4.97	-3.1
	L4	56.96	61.51	8.07	7.86	-2.6
	H1	46.53	51.72	9.88	9.32	-5.7
	H2	37.77	40.94	12.18	11.78	-3.3
	H3	22.74	24.63	20.23	19.60	-3.1
	H4	14.40	15.62	31.93	30.92	-3.2
Reverse	RL	130.74	145.66	3.52	3.31	-6.0
	RH	33.17	36.99	13.87	13.04	-6.0



3.3 PTO PERFORMANCE TEST

S. No.	Particulars	Base Model	Variant Model
1	Date(s) of test	12.11.2013, 13.11.2013, 15.11.2013, 21.11.2013 & 22.11.2013	03.03.2017 & 15.03.2017
2	Tractor run at this Institute prior to start of PTO test. (h)	1.8	2.1
3	Dynamometer test bench used	Fuchino ESF-1000S eddy current	SAJ-AG 250

Maximum power two hours test under natural ambient condition was conducted. The results of Power take-off performance, maximum power two hours test of base & variant max power search observed power are tabulated in **Table-1**.

Table-1

Tractor	Power, (kW)	Speed, (rpm)		Fuel Consumption			Specific energy, (kWh/l)
		PTO	Engine	(l/h)	(kg/h)	(kg/kWh)	
1	2	3	4	5	6	7	8
a) Maximum power – 2 hours test (under natural ambient condition):							
Base model	31.1	612	1999	9.74	8.15	0.262	3.19
b) Maximum power – 2 hours test (under natural ambient condition):							
Variant model	31.5	612	1999	10.37	8.67	0.275	3.04

Sl. No.	Parameters	Base Model		Variant Model
		Natural Ambient	High Ambient	Natural Ambient (Max. power Two Hours)
i)	No load maximum engine speed, (rpm)	2159	2169	2199
ii)	Equivalent crankshaft torque at maximum power (Nm)	148.48	143.42	150.6
iii)	Maximum equivalent crank shaft torque (Nm)	178.45	170.63	--
iv)	Engine speed at maximum equivalent crankshaft torque, (rpm)	1251	1251	--
v)	Backup torque (%)	20.2	--	--
vi)	Range of atmospheric condition :			
	- Temperature, ($^{\circ}$ C)	26 to 30	43 to 45	25 to 26
	- Pressure, (kPa)	97.5 to 98.4	99.4 to 100.2	99.4 to 99.5
	- Relative humidity, (%)	30 to 39	0.1 to 6	35 to 38
vii)	Maximum Temperature, ($^{\circ}$C):			
	- Engine oil	103	116	98
	- Coolant	76	90	75
	- Fuel	43	58	46
	- Air intake	38	51	28
	- Exhaust gas	614	595	638
viii)	Pressure at maximum power:			
	- Intake air, (kPa)	2.1 to 2.3	2.8	3.2 to 3.3
	- Exhaust gas, (kPa)	8.4 to 8.5	7.3 to 7.5	4.3 to 5.9
ix)	Consumptions:			
	Lub. Oil (g/kWh)	--	0.19	--
	-Coolant (% of total coolant capacity)	--	Nil	--



4. OTHER APPLICABLE TESTS

4.1 POWER LIFT AND HYDRAULIC PUMP PERFORMANCE TEST

Date(s) of test : 17.03.2017 & 20.03.2017
 Tractor run at the Institute prior to start of hydraulic test, (h) : 9.1
 Pump speed at rated engine speed, (rpm) : 2000

4.1.1 Hydraulic power test:

Pump delivery rate at minimum pressure and rated engine speed, (l/min) : 35.55
 Maximum hydraulic power, (kW) : 8.7
 Pump delivery rate at maximum hydraulic power, (l/min) : 36.94
 Pressure at maximum hydraulic power, (MPa) : 14.2

Sustained pressure of the open relief valve, (MPa) : 19.8

Tapping point:

a) Relief valve test : External circuit
 b) Pump performance test : Pump outlet
 Temperature of hydraulic fluid, (°C) : 62 to 66

4.1.2 Lifting capacity test :

Test	Height of lower hitch point above ground in down position, (mm)	Vertical movement with lifting forces, (mm)	Maximum force exerted through full range, (kN)	Corresponding pressure, (MPa)	Moment about rear axle, (kN-m)	Max. tilt angle of mast from vertical (degrees)
At hitch points	200	610	19.91	17.8	17.52	--
On the standard frame	200	610	14.54	17.8	21.66	10.9

4.1.3 Maintenance of lift load:

Force applied at the frame, (kN) : 13.09
 Temperature of hydraulic fluid at the start of test, (°C) : 60

Test data:

Elapsed time (minute)	5	10	15	20	25	30
Cumulative drop in height of lift, (mm)	25	40	50	60	68	75

4.2 BRAKE TEST

4.2.1 Service brake:

4.2.2 Cold brake test:

Date of test : 08.02.2017 & 28.04.2017

Type of track : Concrete

Maximum attainable speed (kmph):

With un ballast : 33.7

With road ballasted : N.A

		At maximum attainable speed (kmph)			
Un ballast Tractor (Cold)	Braking device control force, (N)	597	468	348	228
	Mean deceleration, (m/sec ²)	3.42	3.19	3.06	2.50
	Stopping distance, (m)	12.87	13.74	14.30	17.53
Un ballast Tractor (Hot)	Braking device control force, (N)	569	460	351	242
	Mean deceleration, (m/sec ²)	3.40	3.15	2.81	2.50
	Stopping distance, (m)	13.14	13.91	15.60	17.53
		At 25 kmph travel speed			
Un ballast Tractor (Cold)	Braking device control force, (N)	535	429	324	218
	Mean deceleration, (m/sec ²)	3.30	3.09	2.97	2.50
	Stopping distance, (m)	7.40	7.80	8.13	9.65
Un ballast Tractor (Hot)	Braking device control force, (N)	530	441	351	262
	Mean deceleration, (m/sec ²)	3.21	3.11	2.92	2.50
	Stopping distance, (m)	7.55	7.75	8.26	9.65

Note: The manufacturer has not recommended ballasting for road test. Therefore, the brakes fade test was conducted only under unballasted condition.

Maximum deviation of tractor from its original course, (m) : **None**

Abnormal vibration : **None**

The brakes were heated by : **Self-braking**

4.2.4 Parking brake test:

Particulars	Parked on 18 percent slope		12 percent slope with trailer mass of 2.03 tonnes.	
	Facing Up	Facing Down	Facing Up	Facing Down
Braking device control force, (N)	270	290	290	310
Efficacy of parking brake	----- Effective -----			

4.3 LOCATION OF CENTRE OF GRAVITY

Condition	Particulars	Coordinates
Tractor under standard ballast condition but with all the liquid reservoirs full & the operator replaced by a 75 kg mass on the seat	Height above ground, (mm)	825
	Distance forward from the vertical plane containing the axis of rear wheels, (mm)	767
	Distance from the median plane parallel to the longitudinal axis of tractor bisecting the track, (mm)	13.6 (towards RHS)



4.4 TURNING ABILITY

Characteristics	Minimum turning diameter, (m)		Minimum clearance diameter, (m)	
	LHS	RHS	LHS	RHS
Brake applied	6.24	6.25	7.00	7.01
Brakes released	6.96	7.06	7.72	7.76

5. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustment/ Defects/ breakdowns and Repairs	Tractor run hours
1.	During PTO performance test (two hour maximum power) under natural ambient condition, specific fuel consumption was observed in higher side. So, the rain cap was removed and inner & outer element of air cleaner was replaced with new one.	3.8

6. COMPARISON BETWEEN BASE MODEL AND VARIANT MODEL
(Based on Table 3 & 4 of Indian Standard 12207: 2014)

Sl. No.	Clause No.	Features	Observation on base model (T-941/1459/2014, October, 2014)	Observation on variant model	Remarks
1	2	3	4	5	6
1.	i)	Single/dual/Dry / wet/ Independent clutch/Increase in size of clutch	Same configuration in base & variant models (refer para 3.1.12.1)		No change
2.	ii)	Air cleaner	Same configuration in base & variant models (refer para 3.1.5)		No change
		Location of air cleaner	Same configuration in base & variant models (refer para 3.1.5.2)		No change
		Range of suction pressure at maximum power, (kPa)	2.1 to 2.3	3.2 to 3.3	Changed
3.	iii)	Exhaust system	Up draught, elliptical	Up draught, elliptical	No change
		Exhaust gas Pressure at max power, (kPa)	8.4 to 8.5	4.3 to 5.9	Changed
4.	iv)	Location and type of operating controls	Same configuration in base & variant models (refer para 3.1.12.1, 3.1.12.2, 3.1.12.4, 3.1.14 & 3.1.17)		No change



1	2	3	4	5	6	
5.	v)	Gear Box:				
		Reduction ratio of transmission:				
	Forward	Gear	Base model	Variant model	Variation in %	Remarks
		L1	182.83	204.02	-11.6	Changed
		L2	148.65	161.26	-8.5	Changed
		L3	89.63	97.09	-8.3	Changed
		L4	56.96	61.51	-8.0	Changed
		H1	46.53	51.72	-11.2	Changed
		H2	37.77	40.94	-8.4	Changed
		H3	22.74	24.63	-8.3	Changed
		H4	14.4	15.62	-8.5	Changed
	Reverse	LR	130.74	145.66	-11.4	Changed
		HR	33.17	36.99	-11.5	Changed
		Range of speeds (kmph):				
		- Forward	2.52 to 31.93	2.37 to 30.92		Changed
		- Reverse	3.52 to 13.87	3.31 to 13.04		Changed
		Oil capacity, (l)	54.0 (Common with differential, hydraulic rear axle & final drive)	50.0 (Common with differential rear axle, final drive, brakes and hydraulic system)		Changed
6.	vi)	Additional no. of speed	None	None		No change
7.	vii)	Fitment of accessories:				
		- Expansion tank	1.10	1.05		Changed
		- Additional hydraulic pump	None	None		No change
		- Air compressor	None	None		No change
		- Radiator	Provided	Provided		No change
		- Bare radiator capacity, (l)	6.20	5.70		Changed
		- Total coolant capacity, (l)	11.80	11.10		Changed
		- Oil cooler	None	None		No change
8.	viii)	Brake system:				
		Type of brake	Mechanical, dry disc brake	Mechanical, Oil immersed disc brake		Changed
		No. of disc(s)	Two (on each wheel side)	Four (on each wheel side)		Changed
		Area of liners, (cm ²)	740.7 (on each wheel side)	913.3 (on each wheel side)		Changed
9.	ix)	Type of actuation system for clutch & brake	Same configuration in in base and variant models (refer para 3.1.12.1 & 3.1.17)			No change
10.	x)	Provision of accessories:				
		Min. & Max. height of rear lowering hitch, (mm)	410 & 870	620 & 900		Changed



1	2	3	4	5	6	
11.	xi)	Type of three point linkage:	Same configuration in base & variant models (refer para 3.1.13.2)		No change	
		Dimension of ram cylinder & piston	Refer Annexure-I	Refer Annexure-II	Changed	
12.	xii)	PTO shaft (s):				
		Location	Centrally located	8 mm in LHS	Changed	
		Type	Type-I, independent	Type-I, independent	No change	
		Speed corresponding to rated engine speed (rpm)	612	612	No change	
		- Anticlockwise rotation speed (rpm)	Not provided	Not provided	No change	
13.	xiii)	Features and Location of Electrical and Instrumentation:				
		Starter : Make & model	Magneton & Not available	Panalfa & Not available	Changed	
		Generator: Make, rating & model	Magneton ,35A & AS0071812 G	Panalfa, 42A & Not available	Changed	
		Instrumentation on panel	Same configuration in base & variant models (refer para 3.1.11)		No change	
14.	xiv)	Tyre size & Ply rating :				
		Rear tyre: Make, Size & Ply Rating	Good Year, 13.6-28 & 12PR	MRF, 14.9-28 & 12PR	Changed	
		Rim size:	W 12 X 28	W 13 X 28	Changed	
15.	xv)	Type of drive:	2WD	2WD	No change	
16.	xvi)	Sheet metal:				
		Style of bonnet & Fender	Same configuration in base & variant models		No change	
		- Colour	Blue	Blue	No change	
		-Decals (Sticker)	ACE DI 450 NG	ACE DI 47 XT	Changed	
		Fitment of ROPS, Cab & Canopy	ROPS not fitted Canopy fitted	ROPS not fitted Canopy fitted	No change	
17.	xvii)	Type of hydraulic pump, location, drive, speed:				
		Speed of hydraulic pump corresponding to rated engine speed ,(rpm)	2000	2000	No change	
18.	xviii)	Positioning of Hydraulic Sensing Mechanism	Through top link	Through top link	No Change	
19.	xix)	Change related to ergonomics, safety comfort, statutory / regulatory requirements:				
		a)	IS: 10273	Conformed	Conforms	No change
		b)	IS: 4931	Conformed	Conforms	No change
		c)	IS: 4468	Did not conform	Does not conform	No change
		d)	IS: 12953	Conformed	Conforms	No change
		e)	IS:12343	Conformed	Conforms	No change
		f)	IS:12239 (Part-I)	Did not conform	Does not conform	No change
		g)	IS:12239 (Part-II)	Did not conform	Does not conform	No change
		h)	IS:8133	Did not conform	Does not conform	No change
		i)	IS: 6283	Conformed	Conforms	No change
		j)	IS:14683	Conformed	Conforms	No change
20.	xx)	Final Reduction:	4.462 : 1 (58/13T)	4.833 : 1 (58/12T)	Change	



1	2	3	4	5	6
21.	xxi)	Type of fuel Injection pump:	Same configuration in base & variant models (refer para 3.1.4.5)		No change
22.	Change related to statutory/ regulatory requirements (As per Table 4):				
	a)	Engine operating principle (spark/ compression ignition, two/four stroke)	Compression Ignition, 4 stroke	Compression Ignition, 4 stroke	No change
	b)	Number & arrangement of cylinders	Three & vertical inline	Three & vertical inline	No change
	c)	Maximum declared PTO power, (kW)	31.0	31.0	No change
	d)	Engine displacement, (cc)	2857	2857	No change
	e)	Rated engine speed, (rpm)	2000	2000	No change
23.	Other changes:				
	a)	Engine Model	ACE A45	ACE A45	No change
	b)	Model /group combination number of fuel injection pump	E 040 266 800	F 002 AOZ 949	Changed
	c)	Model /group combination number of fuel governor	E 042 207 400	RSV350 ... 1000A5 C 1734R	Changed
	d)	Make of hydraulic pump	Windsor (apa)	Rexroth (apa)	Changed
	e)	Declared lifting force at lower hitch point & standard frame, (kN)	9.53 & 8.68	14.71 & 11.87	Changed
	f)	Location of gear shifting levers	In-front of operator's seat	At RHS of operator's seat	Changed
	g)	Brake system	Mechanical ,dry disc brake	Mechanical, Oil immersed disc brake	Changed
	h)	Output rating of generator	12V, 35 Amps	12V, 42 Amps	Changed
	i)	Unballast mass of tractor, (kg), (front/rear/total)	790/1150/1940	790/1215/2005	Changed
	j)	Wheel base, (mm)	1970	2010	Changed

7. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

- 7.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) and non – evaluative (not mandatory) parameters applicable for qualifying Minimum Performance Criteria as per clause-4 table-1 of Indian Standard 12207: 2014 for acceptance of tractor for the purpose of subsidies/NABARD financing for the applicable features for this tractor model.



T-1093/1618/2017

ACE DI 47 XT TRACTOR - COMMERCIAL (Variant)

Sl. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2014	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: -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	31.0	31.0	31.1	31.5	Yes
b)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	265	265	262	275	Yes
7.1.2 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%]	9.80	14.71	9.53	19.91	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)	11.87 (D)	8.68	14.54	Yes
				7.36 (R)	7.41 (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 Minutes, (mm)	Non Evaluative	[Tolerance of plus 5 mm]	50 (R)	50 (R)	40	75	No



1	2	3	4	5 a	5 b	6 a	6 b	7	
7.1.3	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)	10 (R)	6.21	7.92	Yes
	2)	Hot brake	Evaluative	10	10 (R)	10 (R)	7.33	8.12	Yes
b)	Maximum force exerted on the brake pedal to achieve a deceleration of 2.5 m/s ² (N)		Evaluative	600	600 (R)	600 (R)	155 to 210	253 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	Yes	Yes	Yes	Yes
7.1.4	Literature (Submission to test agency):								
(a)	Operator manual		Evaluative	Provided/ Not Provided	Provided	Provided	Provided	Yes	
(b)	Parts Catalogue		Evaluative	Provided/Not Provided	Provided	Provided	Provided	Yes	
(c)	Workshop/ Service manual		Evaluative	Provided/Not Provided	Provided	Provided	Provided	Yes	

7.2

Salient Observations:

7.2.1

Laboratory tests:

7.2.1.1

PTO Performance:

- i) The maximum PTO power in case of base and variant models was observed as 31.1 & 31.5 kW against the declaration of 31.0 kW respectively, which meets the requirement of IS: 12207-2014 with regard to tolerance limit.
- ii) The specific fuel consumption in case of base and variant models corresponding to maximum power was observed as 262 & 275 g/kWh against the declaration of 265 g/kWh respectively, which meets the requirement of IS:12207-2014 with regard to tolerance.

7.2.1.2

Hydraulic performance :

- i) The lifting capacity at hitch points and standard frame in case of base and variant models was observed as 14.71 & 19.91 and 11.87 & 14.54 kN against the declaration of 9.80 & 9.53 kN respectively, which meets the requirement of IS: 12207-2014 with regard to tolerance limit.
- ii) The drop in the height in case of base and variant models was observed 40 & 75 mm against the declaration of 50 mm during maintenance of lift load test, which does not meet the requirement of IS:12207-2014 with regard to tolerance. This should be looked into for necessary corrective action.

7.2.1.3

Three point linkage:

- i) The lateral distance from lower hitch point to center line of tractor does not meet the requirements of IS: 4468(Part I)-1997. 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. In view of the spirit of standardization, necessary improvements may be incorporated.

**7.2.1.4 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.

7.3 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 safety against accidental start of engine.
- iii) Provision of differential lock.

7.4 Adequacy of Literature supplied with machine:

7.4.1 The following literature has been supplied by the applicant.

- i) Operator's / service manual for DI 305NG, DI 854NG, DI 350NG, DI 37XT, DI 42XT, DI 450NG, DI 47XT, DI 450NG 4WD, DI 550NG & DI 6565 tractor models.
- ii) Workshop for DI 305NG, DI 350NG, DI 37XT, DI 42XT, DI 450NG, DI 47XT, DI 550NG & DI 6565 tractor model.
- iii) Part's catalogue for DI 37XT, DI 42XT & DI 47XT tractor models.

7.4.2 The revised operator's / service manual have been supplied by the manufacturer before the release of this report. Therefore, it is recommended that workshop manual and part's catalogue may also be brought out in national as well as other regional languages for the guidance of users and service personnel.

The results of the tests carried out on variant model "ACE DI 47 XT " have been compared with those on base model "ACE DI 450 NG" and found within the limit, as specified in Indian Standard: 12207-2014.



8. Citizen charter

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given in the citizen charter	Remark
3 Months (February, 2017 to April, 2017)	10 Months	Yes	--

TESTING AUTHORITY:

PRAMOD YADAV
AGRICULTURAL ENGINEER

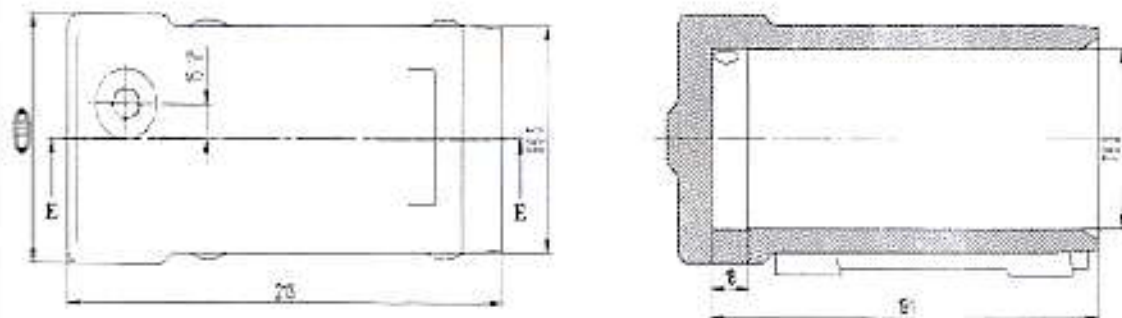
C. V. CHIMOTE
TEST ENGINEER

Y.K. RAO
SENIOR AGRICULTURAL
ENGINEER

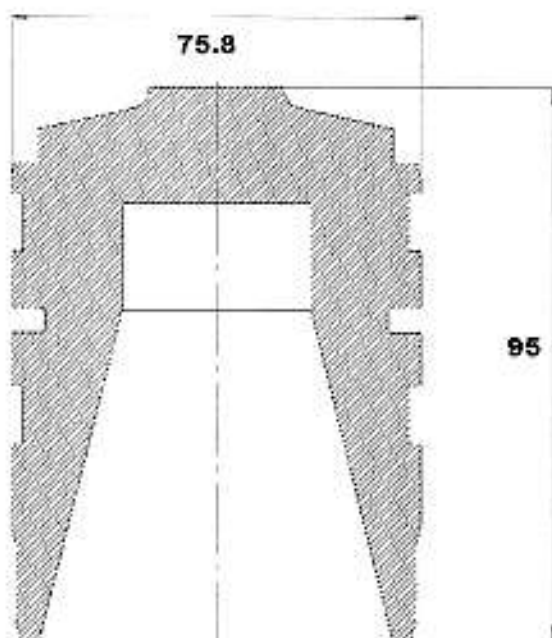
J. J. R. NARWARE
DIRECTOR

9. APPLICANT'S COMMENTS

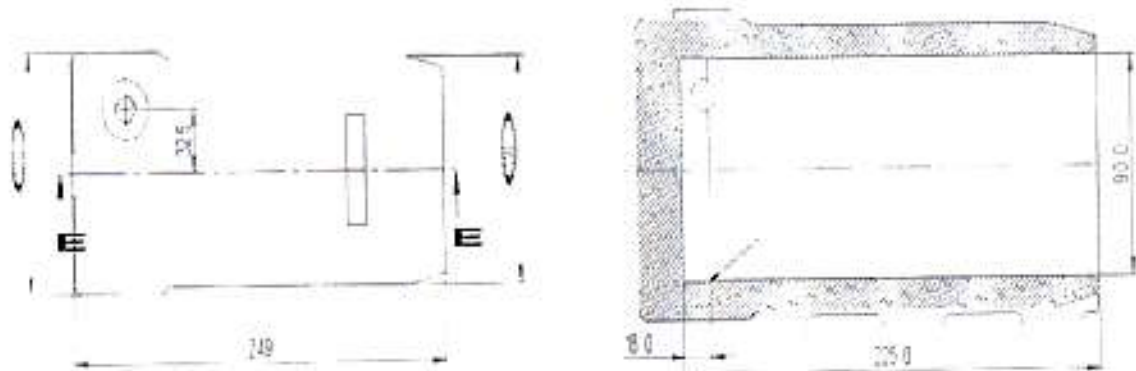
Para No.	Our Reference	Applicant's comments
9.1	7.2.1.2 (ii), 7.2.1.3 & 7.2.1.4	We will take the necessary action during the production.

Annexure-I

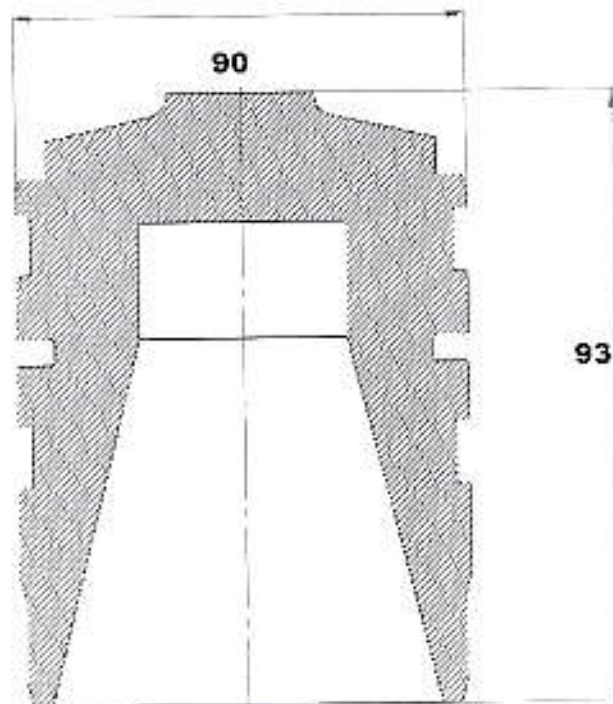
Hydraulic cylinder dimension for base model (1200 kg capacity)



Piston dimension for base model

Annexure-II

Hydraulic cylinder dimension for variant model (1800 kg capacity)



Piston dimension for variant model

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

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running-in	Nil
2.	PTO Performance Test	3.3
3.	Hydraulic performance test	1.4
4.	Turning ability	0.3
5.	Location of centre of gravity	0.3
6.	Brake test	1.5
7.	Theoretical speed test	0.6
B.	Miscellaneous test and other run hours, including idle run transportation, trial and preparation for test.	3.2
	TOTAL	10.6