

OECD Approval No. : 2/3 143
Date of approval : 12th of April, 2019

**Report on test in accordance with
OECD STANDARD CODE 2
for the Official Testing of Agricultural and Forestry Tractors**



Agricultural Tractor Make : **SONALIKA**
Model : **SONALIKA 60 N**
Type : **4 WD (YMD, 30 km/h Speed)**
Manufactured by : **M/s International Tractors Limited,**
Village- Chak Gujran, P.O. Piplanwala,
Jalandhar Road, **HOSHIARPUR**
(Punjab) – 146 022, **INDIA**
Submitted for test by : **The manufacturer**
Report No. : **T-1237/1764/55/OECD/2019**
Date : **April, 2019**

GOVERNMENT OF INDIA
Ministry of Agriculture and Farmers Welfare,
(Department of Agriculture, Cooperation and Farmers Welfare)
Mechanization and Technology Division
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This is a report on a tractor test in accordance with **OECD STANDARD CODE 2** for the Official Testing of Agricultural and Forestry Tractors.

It does not contain an evaluation of the tractor on practical work.

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In this report unit of all performance characteristics are given corresponding to the International system of units.

The relationship to the Technical System of Units is given by the following conversions:								
Force	1	kN	=	1000	N	=	102	kgf
Power	1	kW	=	1000	W	=	1.36	Ps
Pressure	1	MPa	=	10	bar	=	10.2	kgf/cm ²
	100	kPa	=	1000	mbar	=	750.1	mm of Hg

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Statement

The information opposite each item in the specification portion of this report has been validated by the Testing Station. An item marked [C] indicates to the test report user that the information declared by the manufacturer has been checked whereas an item marked [D] indicates that the manufacturer's declaration has been endorsed.

[C]	Tractor manufacturer's name and address	:	M/s International Tractors Limited, Village- Chak Gujran, P.O. Piplanwala, Jalandhar Road, HOSHIARPUR (Punjab) – 146 022, INDIA
[D]	Location of tractor assembly	:	M/s International Tractors Limited, Village- Chak Gujran, P.O. Piplanwala, Jalandhar Road, HOSHIARPUR (Punjab) – 146 022, INDIA
[D]	Submitted for test by	:	The manufacturer
[C]	Selected for test by	:	Testing Authority in the agreement with the manufacturer
[D]	Place of running-in	:	At C.F.M.T&T.I, Budni (M.P.) India
[D]	Duration of running-in:		
	-Engine	:	35 hours
	-Transmission	:	Nil
[C]	Date of start of test	:	8 th of January, 2018
[C]	Location of test	:	Government of India, Central Farm Machinery Training and Testing Institute, P.O.- Tractor Nagar, BUDNI – 466445 (M.P.), INDIA
[C]	Code version	:	OECD Standard Code 2 (February, 2018)

1. SPECIFICATIONS OF TRACTOR

1.1 Identification:

1.1.1 Denomination

[C]	Make of tractor	:	Sonalika
[C]	Model (trade name)	:	Sonalika 60 N
[C]	Type	:	4 WD, Agricultural tractor

1.1.2 Numbers:

[D]	1 st Serial No. or prototype	:	CYMDE460248WNT
[C]	Serial No.	:	KYMDT686896WNT

1.1.3 Other specification (if applicable):

[D]	Model(s) for other countries	:	i) SONALIKA WORLDTRAC 60 RX N ii) SOLIS 60 N
[C]	Transmission type or gears x ranges	:	Mechanical, Synchromesh gears. 12 forward, 12 Reverse gears.
[C]	Speed version	:	30 km/h
[D]	Manufacturer identification or Technical type no.	:	YMD

1.2 Engine:

[C]	Make	:	International Tractors Ltd.
[C]	Model	:	4100 FL
[C]	Type	:	Four stroke, water cooled, direct injection diesel engine
[C]	Serial No.	:	4100FL731674706

1.2.1	Cylinders:		
[C]	Number/disposition	:	Four, vertical, in-line
[D]	Bore/Stroke	:	100 mm / 118 mm
[D]	Capacity	:	3707 cm ³
[D]	Compression ratio	:	18.2 (±0.2):1
[D]	Arrangement of valves	:	Overhead
[D]	Cylinder liners	:	Wet
1.2.2	Supercharging	:	Not applicable
1.2.3	Fuel system:		
[C]	Fuel feed system	:	Lift pump, piston-type, integral with fuel injection pump
	Filter(s):		
[C]	Make	:	Bosch
[C]	Model	:	F 002 H20 109
[C]	Type	:	Primary cloth and secondary paper element
[C]	Number(s)	:	Two
[D]	Capacity of fuel tank	:	77.0 dm ³
	Injection pump:		
[C]	Make	:	Bosch
[C]	Model	:	F 002 AOZ 499
[C]	Type	:	Plunger, in-line
[C]	Serial Number	:	75611496
	Manufacturer's production setting of injection pump:		
[D]	Flow rate (rated engine speed & full load)	:	12 to 14 dm ³ / h
[D]	Timing	:	12 ± 2 degree before TDC
	Injectors:		
[C]	Make	:	Bosch, India
[C]	Model	:	F 002 C70 552
[C]	Type	:	Multihole
[D]	Injection pressure	:	25.0 to 25.8 MPa
1.2.4	Governor:		
[C]	Make	:	Bosch, India
[C]	Model	:	RSV325...1100A5C1442R
[D]	Type	:	Mechanical, variable speed
[D]	Governed range of engine speed	:	700 ± 50 to 2400 ± 50 rev/min
[C]	Rated engine speed	:	2200 rev/min.
1.2.5	Air cleaner:		
	Pre-cleaner:	:	Not available
	Main cleaner:		
[C]	Make	:	Donaldson
[D]	Model	:	Not available
[C]	Type	:	Dry, paper element with additional safety cartridge

[C]	Location of air intake	:	Forward of radiator, under the bonnet
[C]	Maintenance indicator	:	Warning light on dash board
1.2.6	Lubrication System:		
[D]	Type of feed pump	:	Gear pump
[C]	Type of filter(s)	:	Full flow, replaceable paper element
[C]	Number of filter(s)	:	One
1.2.7	Cooling System:		
[C]	Type of coolant	:	Water (with coolant)
[D]	Type of pump	:	Semi open, Centrifugal pump with viscous fan belt driven by engine shaft
	Specification of fan:		
[C]	Number of fan blades	:	06
[C]	Fan diameter	:	360 mm
[C]	Total Coolant capacity	:	9.80 dm ³
[C]	Type of temperature control	:	Thermostat
[D]	Over pressure system	:	88 kPa
1.2.8	Starting system:		
[C]	Make	:	Not announced
[C]	Model	:	Not announced
[C]	Type	:	Electrical, solenoid operated
[D]	Starter motor power rating	:	2.7 kW
[C]	Cold starting aid	:	Heater plug provided in the intake manifold
[C]	Safety device	:	Starter will not operate until the clutch pedal is depressed, the PTO lever is disengaged and the 'forward-reverse gear shift lever' is in neutral position.
1.2.9	Electrical System:		
[C]	Voltage	:	12V
	Generator:		
[C]	Make	:	Not announced
[C]	Model	:	S007-2847
[C]	Type	:	Alternator
[D]	Power	:	0.4 kW @ 6000 rev/min
	Battery:		
[C]	Number	:	One
[D]	Rating	:	88 Ah at 20 hours discharge rate
1.2.10	Exhaust System:		
[D]	Make	:	Sonalika
[D]	Model	:	None
[C]	Type	:	Downdraft, cylindrical
[C]	Location	:	On RHS of engine, below the footrest
1.2.11	Reagent Injection System (if applicable)	:	Not applicable

1.2.12 Diesel Particulate Filter (if equipped) : Not applicable

1.3 Transmission:

1.3.1 Clutch (Travel and power take-off):

[D] Make : LUK India
 [D] Model : LUK DC
 [D] Type : Dual, Dry (for travel and PTO)
 [D] Number of plate(s) : Two
 [D] Diameter of plate(s) : 310 mm (for both travel and PTO)
 [C] Method of operation:
 - Travel : By pressing the clutch pedal, on LHS
 - PTO : By a hand lever provided on RHS of operator's seat.

1.3.2 Gear Box:

[D] Make : Carraro
 [D] Model : T-100
 [D] Type : Mechanical, Synchromesh gears.

	Description:	Forward	Reverse
[C]	Number of gears	4	4
[C]	Number of ranges	3 ('L', 'M' & 'H')	3 ('L', 'M' & 'H')
[C]	Total of arrangements	12	12

'L' = LOW, M = MEDIUM, 'H' = HIGH

[D] Available options : None

1.3.3 Rear axle and final drives:

[D] Make : Carraro
 [D] Model : Not announced
 [D] Type : Epicyclic gear reduction unit

Differential lock:

[D] Type : Pin clutch
 [C] Method of engagement : By depressing a pedal, on RHS
 [C] Method of disengagement : By releasing the above pedal

1.3.4 Front axle and final drives:

[D] Make : Carraro
 [D] Model : Not announced
 [D] Type : Epicyclic gear reduction unit
 - Differential lock : **None**

1.3.5 Total ratios and traveling speeds:

	Movement	GEAR	RANGE	Number of engine revolutions for one revolution of the driving wheels	Nominal traveling speed (*) at rated engine speed of 2200 rev/min, (km/h)
[C]	Forward	1	L	975.84	0.50
[C]		2	L	668.65	0.73
[C]		3	L	462.47	1.06
[C]		4	L	319.29	1.53
[C]		1	M	213.05	2.30
[C]		2	M	145.95	3.35
[C]		3	M	100.84	4.84
[C]		4	M	69.64	7.03
[C]		1	H	48.12	10.16
[C]		2	H	33.02	14.83
[C]		3	H	22.83	21.45
[C]		4	H	15.78	30.98
[C]	Reverse	1	L	1148.44	0.43
[C]		2	L	787.04	0.62
[C]		3	L	544.14	0.90
[C]		4	L	375.69	1.30
[C]		1	M	249.49	1.96
[C]		2	M	171.67	2.85
[C]		3	M	118.83	4.10
[C]		4	M	82.02	5.95
[C]		1	H	56.65	8.62
[C]		2	H	38.83	12.60
[C]		3	H	26.85	18.20
[C]		4	H	18.54	26.41

'L' = LOW, 'M'=MEDIUM & 'H' = HIGH

* Calculated with a tyre dynamic radius index of 590 mm (ISO: 4251-1:2005)

[C] Number of revolutions of front wheels for one revolution of rear wheels : 1.52

1.4 Power take-off:**1.4.1. Main Power Take-Off:**

[C] Type : Independent
 [C] Method of engagement : Mechanical, by a hand lever
 [C] Number of shafts : One
 [C] Method of changing power take-off shaft ends and speeds. : **None**

1.4.1.1 Power take-off proportional to engine speed:

		<u>540 (rev/min)</u>	<u>540 E (rev/min)</u>
[C]	- Location	: At rear of tractor	At rear of tractor
[C]	- Diameter of power take-off shaft end	: 34.74 mm	34.74 mm
[C]	- Number of splines	: 6, Not in conformity with ISO:500 - 3:2004	6, Not in conformity with ISO:500-3 :2004
[C]	- Height above ground	: 595	595 mm
[C]	- Distance from the median plane of the tractor	: 0 mm	0 mm
[C]	- Distance behind rear-wheel axis	: 465 mm	465 mm
[C]	- PTO speed at rated engine speed	: 613 rev/min	721 rev/min
[C]	- Engine speed at standard power take-off speed	: 1938 rev/min	1648 rev/min
[C]	- Ratio of rotation speeds (Engine speed/ PTO speed)	: 3.588 : 1	3.053 : 1
[D]	- Power restriction	: None	None
[D]	Maximum torque transmissible	: 1265 Nm	1265 Nm
[C]	Direction of rotation (viewed from rear of tractor)	: Clockwise	Clockwise

1.4.1.2 Power take-off proportional to ground speed : **None**

1.4.2 Optional power take-off : **None**

1.5 Hydraulic power-lift:

[D]	Make	: MITA
[D]	Model	: Not announced
[C]	Type of hydraulic system	: Open centre
[C]	Type and number of cylinders	: Single acting, one
[C]	Type of linkage lock for transport	: Hydraulic
[D]	Relief valve pressure setting (tolerance)	: 19 ± 2 MPa
[D]	Opening pressure of cylinder safety valve	: 22 ± 1 MPa
[D]	Lift pump type	: Gear type
[D]	Transmission between pump and engine	: Gear drive
[D]	Number and Type of filter(s)	: Two, one strainer type at suction and one canister throw away type at pump input line
[C]	Site of oil reservoir	: Transmission housing
[C]	Type, number and location of tapping points:	
	- Type	: Quick coupling
	- Number	: Four
	- Location	: Behind the operator's seat
	- Maximum volume of oil available to external cylinders	: 36 dm ³

1.6 Three point linkage:

[C] Category	: 1 (In conformity with ISO 730-2009)
[C] Category adapter	: None

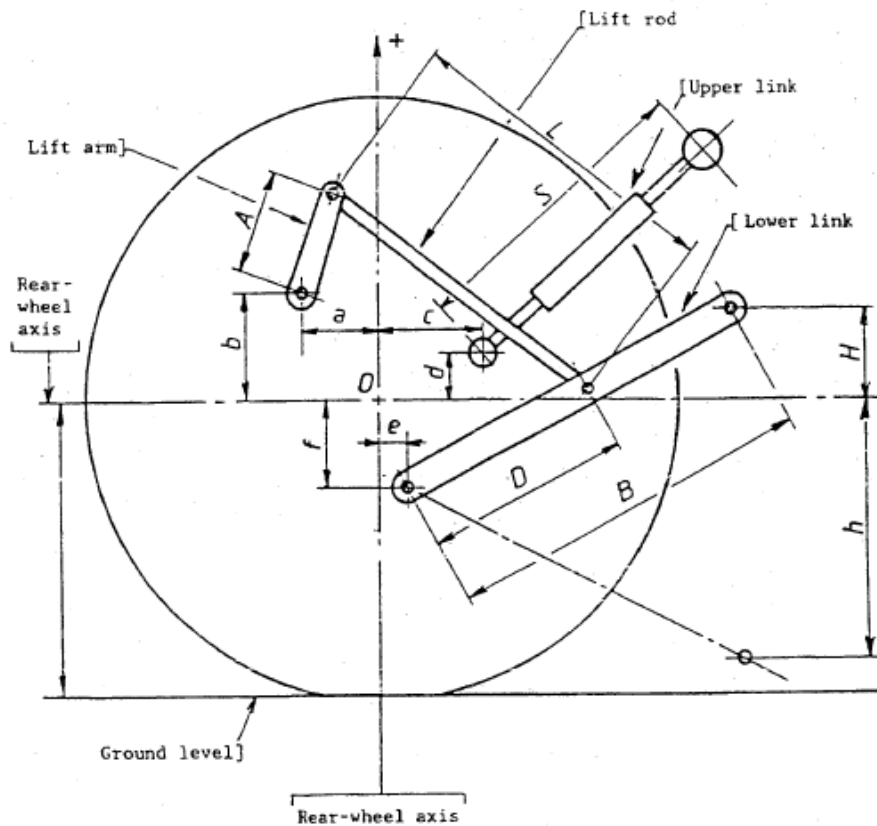


Fig. 1 .1

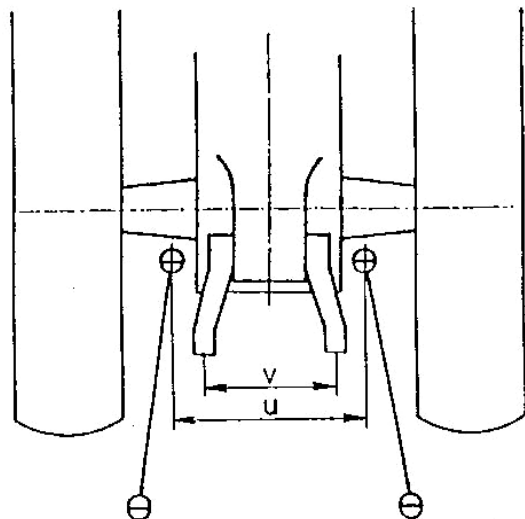


Fig. 1.2

Table: Linkage Geometry dimensions (Ref. fig. 1.1 & 1.2):

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			Dimension or range, (mm)	Settings used during test, (mm)
[C]	Length of lift arms:	(A)	250	250
[C]	Length of lower links:	(B)	880	880
	Distance of lift arm pivot point from rear-wheel axis:			
[C]	- Horizontally	(a)	200,Behind	200,Behind
[C]	- Vertically	(b)	310	310
[C]	Horizontal distance between the 2 lower link points:	(u)	430	430
[C]	Horizontal distance between the 2 lift arm end points:	(v)	400	400
[C]	Length of upper link:	(S)	535 to 730	605
	Distance of upper link pivot point from rear wheel axis:			
[C]	- Horizontally	(c)	410,408 & 400	408
[C]	- Vertically	(d)	270,305 & 345	305
	Distance of lower link pivot point from rear wheel axis:			
[C]	- Horizontally	(e)	125,Behind	125,Behind
[C]	- Vertically	(f)	185	185
[C]	Distance of lower link pivot points to lift rod pivot points on lower links:	(D)	350, 545	350
[C]	Length of lift rods:	(L)	435 to 545	505
	Height of lower hitch points relative to the rear-wheel axis:			
[C]	- in low position	(h)	-545 to -260	-390
[C]	- in high position	(H)	90 to 395	180
[C]	Height above ground of lower hitch points when locked in transport position (*)	--	Any height within lift range	

(*) Assuming r = 590 mm, tyre dynamic radius index of ISO: 4251-1:2005 (pneumatic tyred tractors only).

1.7 Swinging drawbar:

[C]	Type	:	Clevis
[C]	Height above ground:		
[C]	- Maximum	:	375 mm
[C]	- Minimum	:	275 mm
[C]	Type of adjustment	:	Vertical, by different holes on mounting bracket
[C]	Distance of hitch point from rear-wheel axis, horizontally	:	865 mm
	Distance of hitch point from power take-off shaft end	:	
[C]	- Vertically	:	220, 270 and 320 mm
[C]	- Horizontally	:	400 mm
	Lateral adjustment (centre of clevis)		
[C]	- Right hand	:	145 mm
[C]	- Left hand	:	145 mm

[C]	Distance of pivot point from rear-wheel axis, horizontally	:	80 mm
[C]	Diameter of drawbar pin hole	:	33.2 mm
[D]	Maximum vertical permissible load	:	5.42 kN
1.8	Trailer hitch:		
[C]	- Type	:	Clevis
[C]	- Hole diameter	:	33 mm
[C]	- Height above ground	:	840 mm maximum & 340 mm minimum
[C]	- Distance of hitch point from rear-wheel axis, horizontally	:	665 mm
	Distance of hitch point from power take-off shaft end:		
[C]	- Vertically	:	245 mm above & 255 mm below
[C]	- Horizontally	:	200 mm
[D]	- Maximum vertical permissible load	:	5.35 kN
1.9	Holed drawbar:		
[C]	Number of holes	:	7
[C]	Distance between holes	:	80 mm
[C]	Hole diameter	:	25 mm
[C]	Thickness / Width of drawbar	:	39 mm / 75 mm
[C]	Height above ground:		
	- Minimum	:	45 mm
	- Maximum	:	985 mm
[C]	Horizontal distance to power take-off shaft end (rear)	:	540 mm
1.10	Steering:		
[D]	Make	:	Danfoss
[D]	Model	:	Not announced
[D]	Type	:	Hydrostatic, open center
[D]	Method of operation	:	Manual, through steering control wheel
[D]	Pump(s)	:	Gear type
[D]	Ram(s)	:	Double acting cylinder
[D]	Working pressure	:	10±1 MPa
1.11	Brakes:		
1.11.1	Service brake:		
[D]	Make	:	Carraro
[D]	Model	:	Not announced
[D]	Type	:	Oil immersed disc brake
[C]	Method of operation	:	Mechanical, independent or coupled pedal operation
[C]	Trailer braking take-off (hydraulic or air brake)	:	None
1.11.2	Parking brake:		
[C]	Type	:	Pawl and ratchet
[C]	Method of operation	:	Manual, by pawl & ratchet arrangement on a hand lever
1.12	Wheels:		
	Number		
[C]	Front	:	Two (driving & steering)
[C]	Rear	:	Two (driving)

[C] Wheel base : 2215 mm

Track width adjustment:

		Minimum [mm]	Maximum [mm]	Adjustment method
[D]	Front	1110	1270	Reversing wheels and offset lug rims
[D]	Rear	960	1235	Reversing wheels and offset lug rims

1.13 Protective structure:

[D] Make : Sonalika
 [D] Model : 10083231
 [D] Type : Two post front ROPS with rear hard fixture
 [D] Manufacturers name and address : M/s. International Tractors Limited, Village - Chak Gujran, P.O. - Piplanwala, Jalandhar Road, Distt. HOSHIARPUR (Punjab) - 146 022, INDIA
 [D] Protective device : Two post front ROPS with rear hard fixture
 [D] Tiltable / not tiltable : Tiltable with tool
OECD approval:
 [D] Approval number : Not applicable
 [D] Date of approval : Not applicable
 [D] Number of minor modification certificates, if any : Not applicable

1.14 Seat:

1.14.1 Driver's seat:

[D] Make : M/s.Pilot
 [D] Model : Not announced
 [C] Type : Cushioned
 [C] Seat and steering wheel reversible : No
 [C] Type of suspension : Coil springs
 [C] Type of dampening : Hydraulic shock absorber

Range of adjustment:

[C] Longitudinally : ± 50 mm
 [C] Vertically : ± 25 mm
 [C] Safety belt : Provided
 [C] Type : Pelvic

1.14.2 Optional driver's seat(s) : Not fitted on tractor

1.14.3 Passenger seat : Not fitted on tractor

1.15 Lighting:

		Height of centre above ground	Size	Distance from outside edge of lights to median plane of tractor
		[mm]	[mm]	[mm]
[C]	Head lights	1075	155 x 95	215
[C]	Side lights	1300	70 \varnothing	685
[C]	Rear lights	1225	35 x 110	522
[C]	Reflectors	1060	85 x 30	507

2. TEST CONDITIONS

2.1 Overall dimensions (unballasted tractor):				
Length [mm]	Width		Height at top of	
	Minimum [mm]	Maximum [mm]	Protective Structure [mm]	Exhaust pipe [mm]
3920	1470	1630	2575	630

- 2.2** Ground clearance (unballasted tractor) : 275 mm
 Clearance – limiting part : Front differential housing.

2.3 Tractor Mass (without protective structure):

		Unballasted	
		Without driver	With driver
		[kg]	[kg]
Front		1385	1395
Rear		1475	1540
Total		2860	2935

2.4 Tyres and track width specifications:

Tyres		Front	Rear
- Dimensions		8.00 - 18	14.9 – 24
- Ply rating		6	12
- Type		Pneumatic, diagonal	Pneumatic, diagonal
- Maximum load (tyre manufacturer's)		kN	6.57 kN
- Maximum load (tractor manufacturer's)		kN	19.86
- Inflation pressure (tyre manufacturer's)		kPa	6.57 kN
- Dynamic radius index		mm	19.86
- Chosen track width		mm	190
			220
			395
			590
			1130
			1080

- 2.5 Fuel:**
 Type : High speed diesel conforming to IS:1460-2005
 Density at 15 °C : 0.836 g/cm³

2.6 Oils and lubricants:**2.6.1 Capacity and change interval:**

	Capacity, (dm ³)	Oil change, (h)	Filter change, (h)
1.	2.	3.	4.
Engine oil sump	12.3	First change after 50 hours of operation and subsequently after every 250 hours of operation.	First change after 50 hours of operation and subsequently after every 250 hours of operation.
Gear box, rear axle, rear final drive and service brakes	35.5	First change after 1000 hours of operation and subsequently after every 1800 hours of operation.	First change after 50 hours of operation and subsequently after every 250 hours of operation.

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1.	2.	3.	4.
Hydraulic	In common with gear box		
Front axle	4.5	First change after 50 hours of operation and subsequently after every 250 hours of operation.	Not applicable
Front final drive (each)	0.4	First change after 50 hours of operation and subsequently after every 250 hours of operation.	Not applicable
Steering housing	0.7	First change after 50 hours of operation and subsequently after every 1000 hours of operation.	Not applicable

2.6.2 Specifications:

	Recommended	Used during test
Engine:		
Type	SAE 20W-40	As recommended
Viscosity	14.0 to 16.0 cSt at 100°C	
Classification	API CD	
Transmission, Hydraulic fluid, Service brake , Front axle, front final drive, Rear axle and final drive oil:		
Type	Tract-elf-2412	As recommended
Viscosity	10.5 to 12.5 cSt at 100°C	
Classification	GL-2	
Steering oil :		
Type	Dexron II-D	As recommended
Viscosity	7.4 cSt @ 100°C	
Classification	Psf-3	

2.6.3 Grease:

Number of lubricating points:

Grease nipples : 14 Nos.

Grease cups : None

3. COMPULSORY TESTS RESULTS

3.1 Main power take-off test:

Date and location of tests : 25.07.2018, CFMTTI, BUDNI (M.P.), India

Type of dynamometer bench : FUCHINO ESF- 1000 S, Eddy current

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Power, (kW)	Speed			Fuel consumption			Specific Energy, (kWh/l)
	Engine	PTO	Fan	Hourly		Specific	
	(rev/min)			(kg/h)	(l/h)	(g/kWh)	
1	2	3	4	5	6	7	8
3.1.1 Maximum Power – One-Hour Test:							
37.4	2199	613	4211	10.31	12.33	276	3.03
3.1.2 Power at Rated Engine Speed (2200 rev/min) :							
37.4	2199	613	4211	10.31	12.33	276	3.03
3.1.3 Standard Power Take-Off Speed [540 ± 10 (rev/min)] :							
37.1	1938	540	3711	9.69	11.59	261	3.20
3.1.4 Part Loads:							
3.1.4.1 The torque corresponding to maximum power at rated engine speed :							
37.4	2199	613	4211	10.31	12.33	276	3.03
3.1.4.2 85 % of torque obtained in 3.1.4.1 :							
32.7	2257	629	4322	8.87	10.61	271	3.08
3.1.4.3 75 % of torque defined in 3.1.4.2 :							
24.8	2282	636	4370	6.98	8.35	282	2.97
3.1.4.4 50 % of torque defined in 3.1.4.2 :							
16.7	2307	636	4418	5.45	6.52	326	2.56
3.1.4.5 25 % of torque defined in 3.1.4.2 :							
8.5	2336	651	4473	4.10	4.90	482	1.73
3.1.4.6 Unloaded :							
1.0	2364	659	4528	2.94	3.52	2.940	0.28
3.1.5 Part Loads at Standard Power Take-Off Speed [540± 10 (rev/min)] :							
3.1.5.1 The torque corresponding to maximum power :							
37.1	1938	540	3711	9.69	11.59	261	3.20
3.1.5.2 85 % of torque obtained in 3.1.5.1 :							
32.8	2013	561	3855	8.43	10.08	257	3.25
3.1.5.3 75 % of torque defined in 3.1.5.2 :							
24.9	2034	567	3895	6.53	7.81	262	3.19
3.1.5.4 50 % of torque defined in 3.1.5.2 :							
16.7	2056	573	3937	5.0	5.98	299	2.79
3.1.5.5 25 % of torque defined in 3.1.5.2 :							
8.5	2074	578	3972	3.56	4.26	419	2.00
3.1.5.6 Unloaded :							
1.0	2103	586	4027	2.42	2.89	2.420	0.35

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1	2	3	4	5	6	7	8
3.1.6 PART LOADS AT DIFFERENT ENGINE SPEEDS							
3.1.6.1 Maximum power at rated engine speed:							
37.4	2199	613	4211	10.31	12.33	276	3.03
3.1.6.2 80% of power obtained in 3.1.6.1 at max. speed setting :							
29.9	2268	632	4343	8.18	9.79	274	3.05
3.1.6.3 80% of power obtained in 3.1.6.1 with governor control set to 90% of rated engine speed :							
29.9	1981	552	3794	7.67	9.18	257	3.26
3.1.6.4 40% of power obtained in 3.1.6.1 with governor control set to 90% of rated engine speed :							
15.0	1981	552	3794	4.57	5.47	305	2.74
3.1.6.5 60% of power obtained in 3.1.6.1 with governor control set to 60% of rated engine speed :							
22.5	1320	368	2528	5.24	6.27	233	3.59
3.1.6.6 40% of power obtained in 3.1.6.1 with governor control set to 60% of rated engine speed :							
15.0	1320	368	2528	3.72	4.45	248	3.37

No load maximum engine speed : 2364 rev/min

Torque (equivalent crankshaft) at maximum power :

-At rated engine speed : 162.5 Nm

-At one hour test : 162.5 Nm

Maximum torque (equivalent crank- shaft) (Engine speed : 1202 rev/min) : 205.2 Nm

Mean atmospheric conditions:

-Temperature : 23 °C

-Pressure : 97.1 kPa

-Relative humidity : 44 %

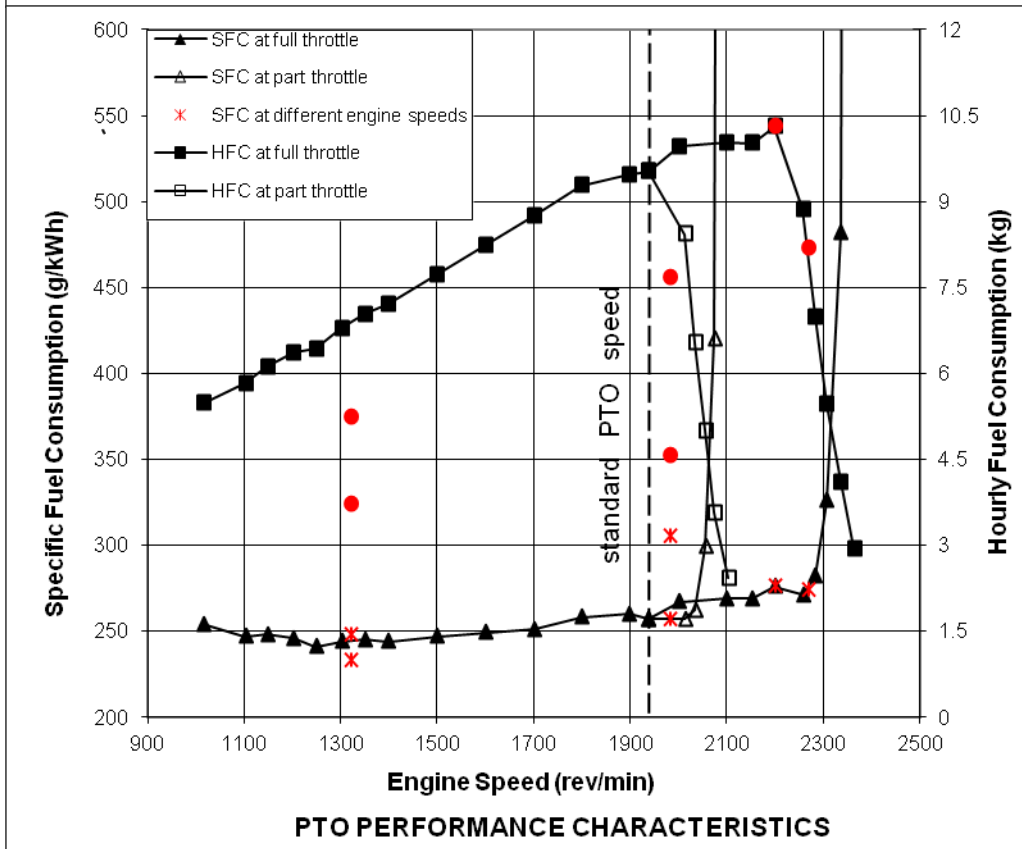
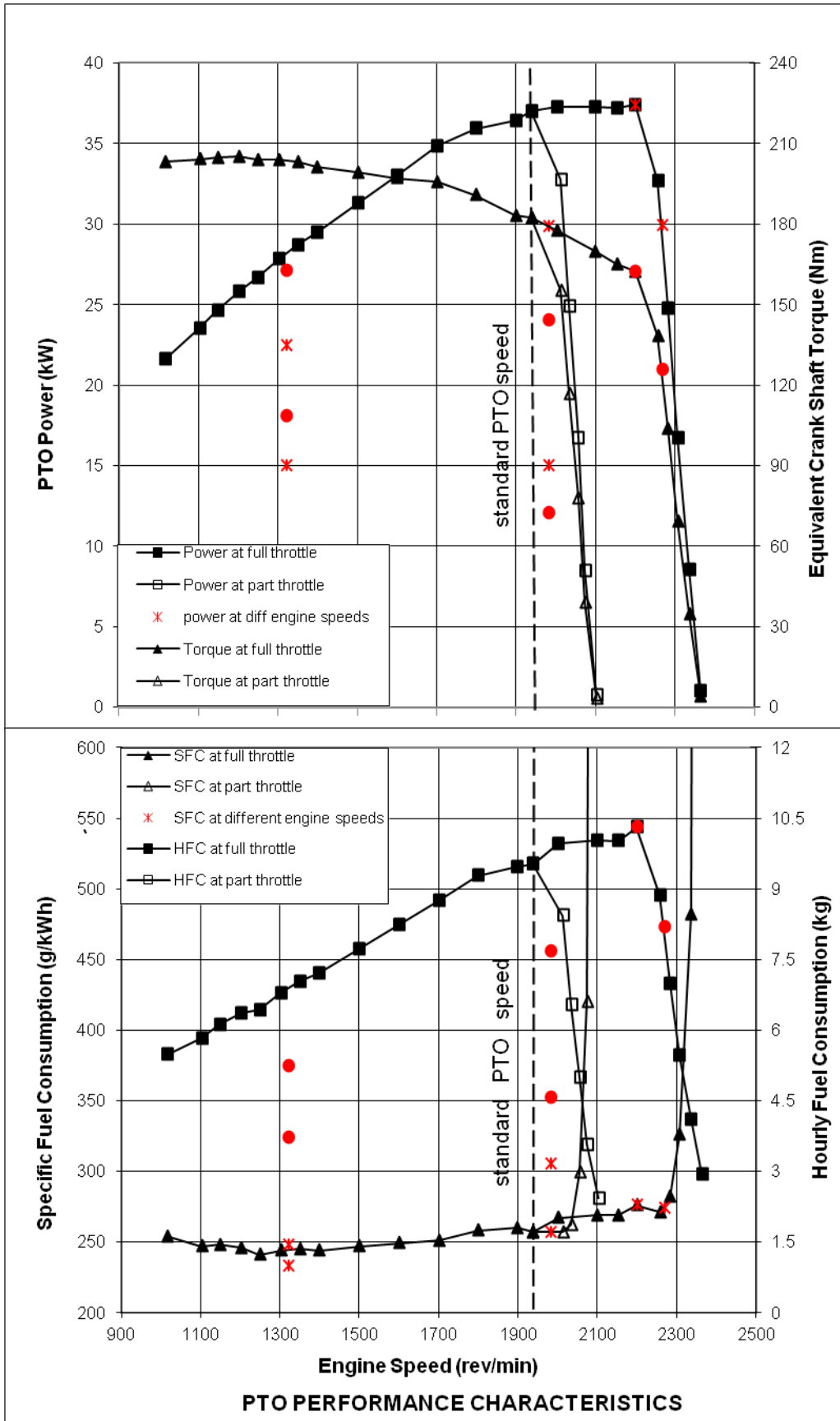
Maximum temperatures:

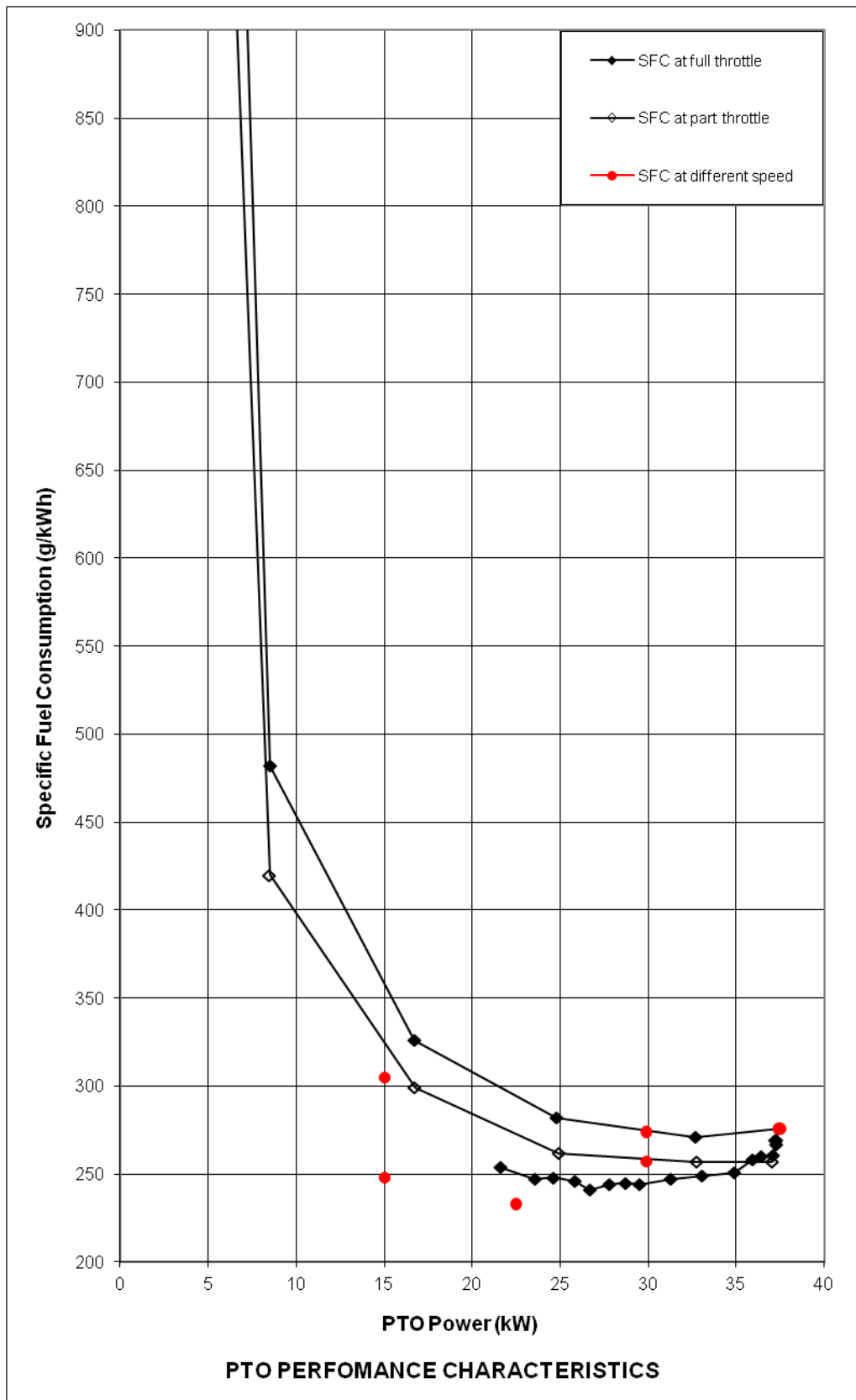
-Coolant : 89 °C

-Engine oil : 112 °C

-Fuel : 48 °C

-Engine air intake : 12 °C





3.2 Hydraulic Power and Lifting force :

Date of tests & location of tests : 13.08.2018 and 14.08.2018, CFMTTI, BUDNI (M.P.), India

3.2.1 Hydraulic Power test :**3.2.1.1 Hydraulic Fluid Data:**

- Hydraulic fluid type : Tract-elf-2412
 - Viscosity index : 10.5 to 12.5 cSt at 100°C
 (ISO 3448: 1992+ corr 1: 1993)
 - Viscosity at 65 °C : 30 cSt

3.2.1.2 Compulsory Reporting (Test Results):

1	2	Press- ure, (MPa)	Reservoir oil Temp. °C		Engine speed, (rev/min)	Flow rate, (l/min)	Power, (kW)
			(min.)	(max.)			
1.	Rated Engine speed (Manufacturer's specification)	--	--	--	2200	--	--
2.	Maximum (sustained) pressure with relief valve open as measured at the coupler. Pump stalled- No	19.0	60	67	2300	0.0	0.0
3.	Flow rate corresponding to a hydraulic pressure equivalent to 90% of the actual relief valve pressure setting and corresponding hydraulic power.	17.1	65		2310	41.2	11.7
4.	Maximum available flow and maximum power from one coupler pair	16.0	64		2318	45.28	12.1
5.	Maximum available flow and maximum power from coupler pairs operating simultaneously (flow through two or in over coupler pair if required)	Not applicable	Not applicable		Not applicable	Not applicable	Not applicable

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3.2.2 Power Lift Test:

-Linkage settings for test - See Table at Page 11, and Fig. 1.1 & 1.2

	At hitch point	On the frame
Height of lower hitch points above ground in down position	200 mm	200 mm
Vertical movement:		
- Without lifting force	570 mm	570 mm
- With lifting force	520 mm	520 mm
Maximum corrected force exerted through full range	22.40 kN	17.21 kN
Corresponding pressure of hydraulic fluid	17.1 MPa	17.1 MPa
Moment about rear wheel axle	22.51 kNm	27.79 kNm
Maximum tilt angle of mast from vertical	--	5.5 degree

Lifting height relative to the horizontal plane including the lower link pivot points:							
Mm	-185	-100	0	+100	+200	+330	+335
Lifting forces (the values of the force measured have been corrected to correspond to a hydraulic pressure equivalent to 90% of actual relief valve pressure setting of the hydraulic lift system.)							
At the hitch point in (kN)	23.80	24.25	24.22	23.85	23.17	22.75	22.40
Corresponding pressure 17.1 MPa:							
At the frame in (kN)	23.58	23.39	22.61	21.35	19.50	17.48	17.21
Corresponding pressure 17.1 MPa							

3.3 Drawbar power and fuel consumption test (unballasted tractor):

Date(s) of tests : 17.01.2019

Type of track : Concrete

Height of drawbar above ground, (mm)	Tyre inflation pressure	
	Front	Rear
	[kPa]	[kPa]
450	190	220

DRAWBAR TEST RESULTS

Gear Number & Range	Draw-bar power	Draw-bar pull	Speed	Engine speed	FAN speed	Slip of wheels	Specific fuel consumption	Specific Energy	Temperature			Atmospheric conditions		
									Fuel	Coolant	Engine oil	Temperature	R.H.	Pressure
	(kW)	(kN)	(km/h)	(rev/Min)	(rev/Min)	(%)	(g/kWh)	(kWh/l)	(°C)	(°C)	(°C)	(°C)	(%)	(kPa)
3.3.1	Maximum Power in tested Gears (Unballasted tractor):													
1M	13.9	24.03	2.08	2295	4395	15.0	442	1.89	36	89	98	25	27	99.2
2M	20.0	24.05	3.00	2272	4351	15.0	419	2.00	35	90	99	24	27	99.2
3M	28.0	24.03	4.19	2200	4213	15.1	374	2.23	35	87	98	23	26	99.3
4M	30.6	16.28	6.76	2201	4215	5.7	347	2.41	34	86	96	21	26	99.4
1H	30.9	11.06	10.07	2199	4211	2.8	341	2.45	33	87	96	20	26	99.5

Remark: Maximum power in the gear '2H' was not measured because forward speed in this gear exceeded the safety limit of testing equipment.

Gear Number & Range	Draw-bar power	Draw-bar pull	Speed	Engine speed	FAN speed	Slip of wheels	Specific fuel consumption	Specific Energy	Temperature			Atmospheric conditions		
									Fuel	Coolant	Engine oil	Temperature	R.H.	Pressure
	(kW)	(kN)	(km/h)	(rev/Min)	(rev/Min)	(%)	(g/kWh)	(kWh/l)	(°C)	(°C)	(°C)	(°C)	(%)	(kPa)
3.3.2	Fuel Consumption:													
3.3.2.1	In selected gear / speed setting nearest 7.5 km/h, at maximum power at rated engine speed:													
4M	30.6	16.28	6.76	2201	4215	5.7	347	2.41	34	86	96	21	26	99.4
3.3.2.1.1	75% of pull corresponding to maximum power at rated engine speed:													
4M	24.1	12.22	7.11	2264	4336	3.6	348	2.40	36	85	100	24	28	99.1
3.3.2.1.2	50% of pull corresponding to maximum power at rated engine speed:													
4M	16.6	8.14	7.35	2290	4382	1.5	378	2.21	36	90	100	24	27	99.1
3.3.2.1.3	Higher gear / speed setting at reduced engine speed: Same pull and traveling speed as in 3.3.2.1.1:													
1H	24.1	12.22	7.11	1566	2999	3.6	298	2.81	35	87	93	25	28	99.0
3.3.2.1.4	Same gear / speed selection as 3.3.2.1.3 at reduced engine speed: Same pull and traveling speed as in 3.3.2.1.2:													
1H	16.6	8.14	7.34	1584	3036	1.6	306	2.73	35	86	91	24	29	99.0
3.3.2.2	In selected gear/speed nearest between 7 km/h and 10 km/h at rated engine speed:													
1H	30.9	11.06	10.07	2199	4211	2.8	341	2.45	33	87	96	20	26	99.5
3.3.2.2.1	75% of pull corresponding to maximum power at rated engine speed:													
1H	24.2	8.29	10.51	2270	4347	1.7	351	2.38	35	83	97	24	30	99.0
3.3.2.2.2	50% of pull corresponding to maximum power at rated engine speed:													
1H	16.4	5.52	10.71	2290	4385	0.7	400	2.09	35	89	99	23	30	99.1
3.3.2.2.3	Higher gear / speed setting at reduced engine speed: Same pull and traveling speed as in 3.3.2.2.1:													
2H	24.2	8.30	10.51	1553	2974	1.5	283	2.95	34	84	89	21	34	99.1
3.3.2.2.4	Same gear / speed selection as 3.3.2.2.3 at reduced engine speed: Same pull and traveling speed as in 3.3.2.2.2:													
2H	16.4	5.53	10.71	1567	3001	0.6	316	2.65	32	87	92	19	37	99.1

4. OPTIONAL TESTS RESULTS

4.1 Waterproofing test:

Date of tests : 23.01.2019
 Water level from ground to top : 400 mm
 Gear number : M4
 Test results:

Parts	Checking method (describe in accordance with test procedures)	Result (Pass/Fail/Not Applied for)
Wheel axles	Visual Method	Pass
Brake assembly	Visual Method	Pass
Clutch housing	Visual Method	Pass

Statement : The tractor is a waterproof tractor in accordance with the code.

5. REPAIR AND ADJUSTMENTS PRIOR TO TESTS

Sl. No.	Particular	Hours of run
--	-None-	--

6. REMARKS

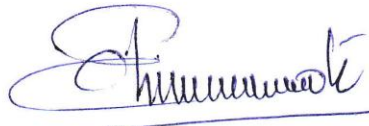
1.	During hydraulic lift test, the maximum angle of mast from vertical was observed as 5.5 degree against the minimum requirement of 10 degree from the vertical.
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TEST CARRIED OUT AT C.F.M.T. & T.I., BUDNI (M.P.), INDIA

TESTING AUTHORITY



PRAMOD YADAV
AGRICULTURAL ENGINEER



C. V. CHIMOTE
TEST ENGINEER



J. J. R. NARWARE
DIRECTOR