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COMMERCIAL TEST REPORT
(Supplementary)

Lk [; k/No. : T- 1268/1795/2019
ekg/Month : October, 2019



MAHINDRA, 595 DI SUPER TURBO TRACTOR
(Brand name : Sarpanch)



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GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
(Deptt. of Agricultural, Cooperation & Farmer's Welfare, Mechanization & Technology Division)

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T-1268/1795/2019	MAHINDRA, 595 DI SUPER TURBO TRACTOR (Brand Name : Sarpanch) – Commercial (Supplementary)
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**Manufacturer : M/s. Mahindra & Mahindra Limited
(Farm Equipment Sector)
Akurli Road, Kandivli (East)
MUMBAI – 400 101**

Month: October	Test Report No. T-1268/1795/2019	Year: 2019
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T-1268/1795/2019	MAHINDRA, 595 DI SUPER TURBO TRACTOR (Brand Name : Sarpanch) – Commercial (Supplementary)
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Type of Test : **COMMERCIAL (Supplementary)**
 Test code/Procedure : IS: 5994 -1998 (Reaffirmed in 2014),
 and IS: 12207-2014
 Period of Test : January, 2019 to June, 2019
 Test Report No : **T-1268/1795/2019**
 Month/Year : **October, 2019**

- 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 was selected randomly from production line by the testing authority 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 supplementary test report and should be read in conjunction with the Test Report of base model i.e. **“Mahindra 595 DI Super Turbo (Brand name: Sarpanch)”** Tractor bearing No. **T- 908/1423/2014** released **February, 2014**.

SELECTED CONVERSIONS			
Sl. No	Units	Conversion Factor	
1	Force:		
	1 kgf	9.80665 N	
		2.20462 lbf	
2	Power:		
	1 Mechanical horse power	1.01387	Metric horse power
		745.7 W	
	1 Metric horse power	735.5 W	
	1 kW	1.35962	Metric horse power
3	Pressure:		
	1 psi	6.895 kPa	
	1 kgf/cm ²	98.067 kPa = 735.56 mm of Hg	
	1 bar	100 kPa = 10 N/cm ²	
	1 mm of Hg	1.3332 m-bar	

ABBREVIATIONS	
apa	As per applicant
TDC	Top Dead Centre
IS	Indian Standard
LHS /RHS	Left Hand Side/ Right Hand Side
Hg	Mercury
Temp.	Temperature
N.R.	Not recorded
rpm	Revolutions per minute
O.D/I.D	Outer diameter/ Inner diameter
N.A.	Not available/Not applicable
PTO	Power take-off
R.H.	Relative Humidity
SIP	Seat Index Point

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Manufacturer	: M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Akurli Road, Kandivli (E) MUMBAI – 400 101
Location of manufacturing plants (apa)	: (i) M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Akurli Road, Kandivli (E) MUMBAI – 400 101 (ii) M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Hingna Road, Hingna MIDC NAGPUR – 440 016. (Maharashtra) (iii) M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Agri Business Development Centre, Khatima Panipat Highway, Udham Singh Nagar, Vil. Lalpur, Tehsil-Kichha, RUDRAPUR – 263 153, (Uttaranchal) (iv) M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Agri Development Centre, Vil-Mehla Tehsil – Dudu Jaipur- Ajmer Road, JAIPUR – 303 007, (Rajasthan) (v) M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Near Bidar 'T' Junction, Mahindra Nagar, Zaheerabad, Medak district- (A.P.)- 502 220
Test requested by (applicant)	: M/s. Mahindra & Mahindra Limited (Farm Equipment Sector) Akurli Road, Kandivli (E) MUMBAI – 400 101
Selected for test by	: The manufacturer
Selected for test by	: Testing Authority
Place of running-in	At manufacturer's works
Duration of said running-in (h):	
- Engine	: 15
- Transmission	: 30
Method of Selection	: The test sample was selected randomly out of five tractors from the production line by the representative of testing authority.

Subsequent to the examination of the case in the light of clause **3.2.4 & 6.0** of **Indian Standard 12207: 2014**, the following tests were considered to be carried out:

- Specification checking in full
- Nominal speed test
- PTO power Performance test, under normal ambient condition.
- Brake performance test
- Turning ability test

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1. SCOPE OF TEST

The “Mahindra 595 DI Super Turbo (Brand Name: Sarpanch)” tractor had undergone “Initial Commercial Test” at this Institute vide test report No. **T- 908/1423/2014** was released in **February, 2014**. The firm has made the following changes in the technical specifications of tractor and had requested vide letter No. nil, dated: 13.12.2017, for **Supplementary** testing of “Mahindra 595 DI Super Turbo (Brand Name: Sarpanch)” tractor.

The applicant informed that the last chassis number of tractor model “Mahindra 595 DI Super Turbo (Brand Name: Sarpanch)” with dry brake system produced was “NLTA00239” in October, 2013.

The major features of Base model and Supplementary model are listed below :-

S. No.	Parameters	Previous Sample (T-908/1423/2014 February, 2014)	Present Sample
1	2	3	4
1.	Tractor:		
	Make	Mahindra	Mahindra
	Model	595 DI Super turbo	595 DI Super turbo
	Declared maximum PTO power, kW	32.5	32.5
2.	Fuel feed pump:		
	Model / Group combination number	FP/KS22AD62, 9440030029	FP/KSG22AD105
3.	Fuel Injection pump:		
	Model/Group Combination No.	F002A0Z874, PES4A85D320RS35	F002A0Z874, PES4A85D320RS3593
4.	Fuel injectors:		
	Model/Group combination No.:		
	-Holder no.	F002C70007111	F002C70007856
	-Nozzle no.	DSL144P949	DSL144P949
5.	Air intake system:		
	Range of suction pressure at maximum power, (kPa)	3.2 to 3.5	7.2 to 8.3
6.	Exhaust System:		
	Position of silencer outlet with respect to SIP, (mm):		
	- Vertical	760	775
	- Longitudinal	1300	1250
	- Lateral	220(on RHS)	225 (on RHS)
	Range of exhaust gas pressure at maximum power, (kPa)	70.8 to 74.5	70.8 to 72.0
7.	Steering:		
	Make	Rane	Danfoss
	Type	Mechanical, worm and nut with re-circulating ball type, having single drop arm.	Hydrostatic
	Location	On clutch housing	Above bell housing
	Diameter of steering control wheel, (mm)	430	420
8.	Service Brake:		
	Make	TVS Girling	Brakes India (apa)
	Type	Mechanical, dry disc brakes	Mechanical, Oil immersed multi discs brake.
	No. of friction disc(s)	Two (on each wheel side)	Four (on each wheel side)

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1	2	3	4
	Area of liners, (cm ²)	880.5 (on each wheel side)	874.3 (on each wheel side)
	Material of liners	Asbestos molded SA 36 (apa)	Paper base (apa)
9.	Rear axle and Final drive:		
	Reduction through final drive	3.583 : 1 (43/12 T)	3.692 : 1 (48/13 T)
10.	Rear towing Hitch:		
	Height above ground level, (mm) :		
	- Maximum	678	488
	- Minimum	358	683
	Number of positions	Four	Five
11.	Wheel Equipment:		
i)	Steering Wheel (s):		
	Front Track width, (mm)	1245(Std.),1355,1445,1485,1595,1695,1795,1805 & 1865	1265 (std.) & 1455
ii)	Drive wheel (s):		
	Size	13.6 -28	14.9-28
	Rear Track width, (mm)	1395 (Std.),1295, 1530, 1575, 1595 1675, 1765, & 1875	1420 (std.), 1445, 1535, 1625, 1705, 1725, 1815
12.	Wheel base, (mm):	1940	1975
13.	Mass of tractor:	Unballast	Standard ballast
	- Front	760	780
	- Rear	1250	1250
	- Total	2010	2030
14.	Overall dimensions, (mm):		
	- Length	3380	3530
	- Width	1825	1830
	- Height	2165	2175
	Minimum ground clearance, (mm)	335 (Below front axle)	317 (below front axle std. ballast weight)
15.	Nominal speeds, (kmph):		
	-Forward	3.04 to 32.22	3.09 to 32.78
	Reverse	4.61 to 13.53	4.30 to 12.63
16.	Capacity of liquids, (l):		
	Bare radiator capacity	3.13	2.80
	Total coolant capacity	8.650	7.65
	Transmission oil capacity	23.5 (Common with differential, rear axle & final drive systems)	44.5 (common with differential, rear axle & final drive, steering, brake & hydraulic system).
	Steering oil capacity	0.80	44.5 (common with transmission system.)
	Hydraulic oil capacity	10.5	
	Brake oil capacity	NA	

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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	SAE 15W40	As recommended
2.	Steering housing	EP 140	Oil originally filled in the tractor was not changed
3.	Transmission, Hydraulic, Steering housing, brake system, rear axle and final drive oil	MTRAC 30	
4.	Grease	MP3 lithium base	MP grease

3. ESSENTIAL TESTS

3.1 SPECIFICATIONS

3.1.1 Tractor:	<u>Previous Sample</u>	<u>Present Sample</u>
Make : Model : Brand name : Type : Year of manufacture : Chassis number : Country of Origin :	Mahindra 595 DI Super Turbo Sarpanch Four wheeled, Rear wheel drive unit construction general purpose Agricultural Tractor. GB (October, 2011)	FJ (September, 2018) MBNADAKALJNF01 907 India
3.1.2 Engine: Make : Model : Type : Serial number : Engine speed (Manufacturer's recommended production setting), (rpm): - Maximum speed at no load, : - Low idle speed : - Speed at maximum torque : Rated speed, (rpm): - For PTO use : - For drawbar use :	Mahindra MDI 3000TC 3A Four stroke, turbo charged, liquid cooled, direct injection, diesel engine. NLT 282	NJF2RHE0017 2250 to 2350 700 to 800 1200 to 1400 2100 2100
3.1.3 Cylinder & Cylinder Head: Number : Disposition : Bore/stroke, (mm) : Capacity as specified by the applicant, (cc) :	Four Vertical, Inline 88.9/101.6 (apa) 2523	88.9/101.6 (apa) 2523

		<u>Previous Sample</u>	<u>Present Sample</u>
	Compression ratio	:	18.75 : 1
	Type of cylinder head	:	Monoblock
	Type of cylinder liners	:	Wet, replaceable
	Type of combustion chamber	:	Re-entrant bowl cavity on piston top
	Arrangement of valves	:	Overhead, inline
	Valve clearance (cold/hot):		
	- Inlet valve, (mm)	:	0.30/0.40 0.30/0.40
	- Exhaust valve, (mm)	:	0.40/0.50 0.40/0.50
3.1.4	Fuel System:		
	Type of fuel feed system	:	Gravity and force feed
3.1.4.1	Fuel tank:		
	Capacity, (l)	:	55.6 56.0
	Location	:	Above clutch housing
	Provision for draining of sediments / water	:	Provided
	Material of fuel tank	:	Metallic
3.1.4.2	Water separator:	:	Not provided
3.1.4.3	Fuel feed pump:		
	Make	:	Bosch, India
	Type	:	Mechanical Plunger type with hand primer
	Model, Group combination number	:	FP/KS22AD62, 9440030029 FP/KSG22AD105
	Location	:	On Fuel Injection pump.
	Method of drive	:	Through camshaft of Fuel Injection pump
3.1.4.4	Fuel filters:		
	Make	:	Bosch, India
	Model/Group combination No	:	F 002H20117 F 002H20117
	Number(s)	:	Two Two
	Type of elements:		
	- Primary	:	Cloth
	- Secondary	:	Paper
	Capacity of final stage filter, (l)	:	0.50 0.48
3.1.4.5	Fuel Injection pump:		
	Make	:	Bosch, India
	Model/Group Combination No.	:	F002A0Z874, PES4A85D320RS35 F002A0Z874, PES4A85D320RS3593
	Type	:	Inline, plunger
	Serial number & Part No.	:	11145477 85635381
	Method of drive	:	Through timing gears
3.1.4.6	Fuel injector(s):		
	Make	:	Bosch, India
	-Holder Number	:	F002C70007111 F002 C70007856
	-Nozzle Number	:	DSL A144P949 DSL A144P949
	Type	:	Multihole (Five holes)
	Manufacturer's production pressure setting, (MPa)	:	24.5 +0.78 24.5 +0.78
	Injection timing	:	3±1 Degree BTDC
	Firing order	:	1 – 3 – 4 – 2

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3.1.4.7 Governor:		<u>Previous Sample</u>		<u>Present Sample</u>
Make	:	Bosch, India		
Model/Group Combination No.	:	RSV350...1050A1C1432R		
Type	:	Mechanical, centrifugal, variable speed		
Rated engine speed, (rpm)	:	700 to 2350		
Governed range of engine speed, (rpm)	:	2100		
3.1.5 Air Intake System:				
3.1.5.1 Pre cleaner	:	Not provided		
3.1.5.2 Air cleaner:				
Make	:	Donaldson		
Type	:	Dry type		
Location	:	Above the radiator, under the bonnet		
Range of suction pressure at maximum power, (kPa)	:	3.2 to 3.5		7.2 to 8.3
Details of elements: (Same as previous)	:	Secondary element	Primary element	Secondary element
- Size (OD/ID), (mm)	:	75/65		127/84
- Length, (mm)	:	300		296.5
- Type	:	Paper		Fabric
- No. of elements	:	Two		
Air flow restriction indicator	:	Provided on dash board		
Dust unloading valve	:	Provided		
Maintenance schedule	:	Cleaning of primary element if required in arduous condition or at every 250 hours of operation. Replace primary element at every 750 hours of operation or 2 cleaning of primary filter element. Replace Secondary element at every 2250hrs or 3 rd replacement of primary filter element.		
3.1.6 Exhaust System:				
Type of silencer	:	Updraft, (Cylindrical).		
Position of silencer outlet with respect to SIP, (mm):				
- Vertical	:	760		775
- Longitudinal	:	1300		1250
- Lateral	:	220(on RHS)		225 (on RHS)
Range of exhaust gas pressure at maximum power, (kPa)	:	70.8 to 74.5		70.8 to 72.0
Provision of spark arresting device	:	None		
Provision against entry of rain water	:	A bend is provided at the top of silencer		
3.1.6.1 Turbocharger:				
Make	:	Holset		
Model	:	HX 20		
Type	:	Non Waste gate Turbo		
Boost Pressure Ratio	:	1.55 (apa)		1.55 (apa)
Speed at rated engine speed, (rpm)	:	160000		160000 (apa)
Method of lubrication	:	Force feed lubrication from main oil gallery of engine.		
Location	:	Above engine, under the bonnet		
3.1.6.2 Exhaust Gas Recirculation system	:	Not provided		

3.1.7 Lubricating system:	<u>Previous Sample</u>	<u>Present Sample</u>
Type	Forced feed-cum-splash	
Oil sump capacity, (l)	8.0	8.2
Total lubricant oil capacity, (l)	8.8	9.0
Oil change period	First change after 250 hours and subsequently after every 500 hours of operation.	
Type of cooling device, (if any)	Plate type oil cooler provided, having five numbers of plates. The cooler is connected with water pump outlet & engine water jackets.	
3.1.7.1 Filters:		
Make	Mhale/Purolator <small>(apa)</small>	Elofic
Type	Full flow, spin-on paper element.	
Number	One	
Capacity	0.80	
3.1.7.2 Pump:		
Type	Gear	
Method of drive	Through timing gears	
Pressure release setting, (kPa)	206 to 241	206 to 241
Minimum permissible pressure, (kPa)	--	200
3.1.8 Cooling system:		
Type	Forced circulation of coolant & water	
Coolant as recommended	Mobile coolz coolant additive, having coolant and water in ratio 0.05:1	
Details of Pump	Centrifugal, semi open impeller having seven vanes of 82.5 mm diameter and driven through crankshaft pulley by a cogged "V" belt.	
Details of fan	Suction type, having six metallic blades of 400 mm diameter and mounted on water pump.	
Additional cooling device	None	
Means of temperature control	Thermostat	
Bare radiator capacity, (l)	3.125	2.80
Expansion flask capacity, (l)	0.850	0.85
Total coolant capacity, (l)	8.650	7.65
Radiator cap pressure, (kPa)	88	
3.1.9 Starting System:		
Type	12V, DC, electrical	
Aid for cold starting	None	
Any other device provided for easy starting	None	

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3.1.10 Electrical System:		<u>Previous Sample</u>	<u>Present Sample</u>
3.1.10.1 Battery:			
Make and model	: SF SONIC & SFN88L		EXIDE & 95D31LMF
Type	:		Lead Acid
Capacity and rating	:		12V, 88 Ah at 20 hour discharge rating
Location	:		RHS of clutch housing in a separate metallic box.
3.1.10.2 Starter:			
Make	: Lucas TVS		Auto Lek
Model	: 6M 14		NA
Type	:		Pre-engaging solenoid operated
Power rating	: 12V, 2.2 kW		12V, 2.2 kW (apa)
Serial Number	: 26024036A		NA
3.1.10.3 Generator:			
Make	:		Autolek
Model	: ALT 4005 H		ALT 4005 H
Type	:		Alternator
Serial number	:		N.A
Output rating	: 12V, 35 Amp		12V, 35 Amp
Method of drive	:		Through water pump pulley by a cogged "V".
3.1.10.4 Voltage regulator	:		In-built with alternator
3.1.10.5 Details of lights:			

Description	No. & capacity of bulb	Height of the centre of beam above ground level, (mm)	Size, (mm)				Distance between centre of the beam and outside edge of tractor at standard rear track setting, (mm)	
Front Lights:								
			Previous	Present	Previous	Present	Previous	Present
- Head lights	2, 12V, 55/60W	1220	1210	180 x 95	170 x 95	755	760	
- Parking lights	2, 12V, 5W	1300	1330	70 x 15	35 x 65	232	255	
- Turn Indicators-cum- hazard indicators	2, 12V, 21W	1330	1330	75 x 55	75 x 65	230	200	
Rear lights:								
- Parking-cum-brake light	2, 12V, 5 / 21W	1300	1320	65 x 55	45 x 65	297	240	
- Turn Indicators-cum- hazard indicators	2, 12V, 21W	1300	1320	65 x 50	35 x 65	167	165	
- Plough light (On RHS mudguard)	1, 12V, 55W	1390	1415	110 Φ	110 Φ	405	400	
- Reflector(s) (Red)	2	1300	1320	60 x 50	35 x 55	232	205	
Registration plate Light	Part of rear light assembly							

3.1.11	Instrument panel details:	<u>Previous Sample</u>	<u>Present Sample</u>
	i) Engine speed-cum-cumulative digital run-hour-meter (0 to 30) x 100 rpm	Provided	Provided
	ii) Coolant temperature gauge (with colour zones).	Provided	Provided
	iii) Fuel level gauge (with colour zones).	Provided	Provided
	iv) Lub.oil pressure indicator light	Provided	Provided
	v) Main switch (key-turn type)	Provided	Provided
	vi) Light switch (Rotary type)	Provided	Provided
	vii) Plough Light switch	Provided	Provided
	viii) Hazard warning light switch	Provided	Provided
	ix) Turn-cum-hazard indicator lights (Tell-tale)	Provided	Provided
	x) Battery charging indicator light	Provided	Provided
	xi) Head lamp (high beam) 'ON' indicator light	Provided	Provided
	xii) Parking brake indicator light	Provided	Provided
	xiii) Air cleaner clogging warning indicator light	Provided	Provided
	xiv) Horn push button	Provided	Provided
	xv) Hand accelerator lever	Provided	Provided
	xvi) Steering control wheel	Provided	Provided
	xvii) Rear view mirror.	Provided	Provided
	xviii) Engine stop knob.	Provided	Provided
	xix) Plough light indicator	NA	Provided
3.1.12	Transmission System:	<u>Previous Sample</u>	<u>Present Sample</u>
3.1.12.1	Clutch:		
	Make	: Valeo	: Valeo (apa)
	Type	: Single, Dry friction plate, diaphragm type.	: Single, Dry friction plate
	No. of friction plate(s)	: One	: One
	Size, (OD/ID) (mm):	: 279.7/170 Φ	: 280.0 /170.3 Φ
	Method of operation:	: By pressing clutch pedal fully provided on LHS of operator's seat.	
3.1.12.2	Gear box:		
	Make	: Mahindra	
	Type	: Mechanical, Combination of Sliding & Constant mesh gears	
	Gear shifting pattern		
		<u>Gear shift lever</u>	<u>Range shift lever</u>
	Location of gear shifting levers:		
	Main gear lever	: In front of Operator's seat	
	Range shift lever	: In front of Operator's seat	
	No. of speeds:		
	- Forward	: 8	: 8
	- Reverse	: 2	: 2

	<u>Previous Sample</u>	<u>Present Sample</u>
Oil capacity, (l)	: 23.5 (Common with differential, rear axle & final drive systems)	44.5 (common with differential, rear axle & final drive, steering, brake & hydraulic system).
Oil changing period	: After every 1000 hours of operation.	First change after 1200 hours and subsequently after every 1200 hours of operation.
3.1.12.3 Differential unit:		
Type	: Crown wheel & pinion with differential unit accommodated inside the differential housing.	
Reduction through crown wheel and pinion	: 4.182 : 1 (46/11 T)	4.182 : 1 (46/11 T)
Oil capacity of final drive, (l)	: 23.5 (Common with gear box & differential systems).	44.5 (common with gearbox, rear axle & final drive, steering, brake & hydraulic system).
Oil changing period	: After every 1000 hours of operation.	First change after 1200 hours and subsequently after every 1200 hours of operation.
3.1.12.3.1 Differential lock:		
Type	: Dog clutch	
Location	: On RHS of operator's seat	
Method of operation	: By pressing a pedal provided at RHS of operator's seat	
3.1.12.4 Rear axle and Final drive:		
Make	: Mahindra (apa)	
Type	: Bull gear and pinion type reduction unit accommodated inside differential housing	
Reduction through final drive	: 3.583 : 1 (43/12 T)	3.692 : 1 (48/13 T)
3.1.13 Power lift (Hydraulic System):		
Make	: Mahindra	
Type	: Open centre, live & ADDC	
No. and type of cylinder	: One, single acting	
Type of linkage lock for transport	: Hydraulic, isolating valve in fully closed position act as transport lock.	
3.1.13.1 Hydraulic pump:		
-Make	: Dowty	Dynamics (apa)
-Type	: Gear	
-Location & drive	: On RHS of engine & through timing gears.	
No. & Type of filter	: Three	
	i) One strainer at suction	
	ii) Full flow spin on paper element type	
	iii) Orifice filter on distributor	

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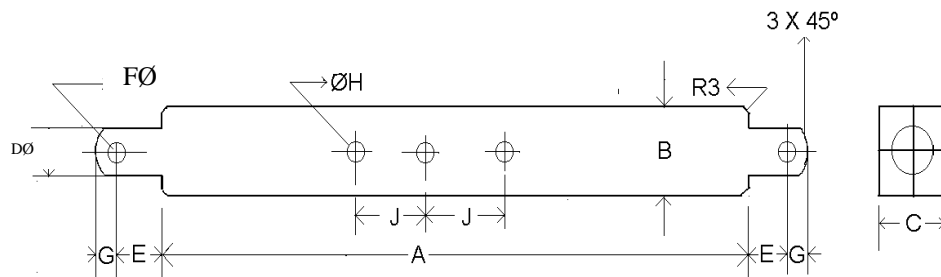
	<u>Previous Sample</u>	<u>Present Sample</u>
Hydraulic oil capacity, (l) :	10.5	44.5 (common with gearbox, differential, rear axle & system).
Oil change period :	After every 1000 hours of operation	First change after 1200 hours and subsequently after every 1200 hours of operation.
Provision for external tapping :	Provided	
Details of control levers :	i) Position control lever ii) Draft control lever iii) Isolating valve knob on distributor	
Method of draft sensing :	Through top link	

3.1.13.2 Three point linkage:

S. No.	Observations	As per IS: 4468- (Part-1) -1997 (Reaffirmed in Oct., 2017) (Cat.I / Cat.II), (mm)	As measured, (mm)		Remarks	
			<u>Previous Sample</u>	<u>Present Sample</u>		
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	19.32	25.86	Conforms to Cat. II
	b)	Width of ball	44.0 (max.) / 51.0 (max)	43.72	50.9	Conforms to Cat. II
II.	Lower hitch points:					
	a)	Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.00	29	29.0	Conforms to Cat. II
	b)	Width of ball	34.8 to 35.0 / 44.8 to 45.0	45	38.0	Does not conform
III.	Lateral distance from lower hitch point to centre line of tractor		359 / 435	458	432	Does not conform
IV.	Lateral movement of lower hitch points		100 (min) / 125 (min)	160	158	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	555	565	-do-
VI.	Transport height (without force)		820 (min) / 950 (min)	905	1000	-do-
VII.	Power range		560 (min) / 650 (min)	630	640	Conforms to Cat. I
VIII.	Leveling adjustment		100 (min) / 100 (min)	360	415	Conforms to Cat. I & II
IX.	Lower hitch point tyre clearance		100 (min) / 100 (min)	160	225	-do-
X.	Lower hitch point height		200 (max) / 200 (max)	200	200	-do-

3.1.13.3 Drawbar:

3.1.13.3.1 Linkage Drawbar [Refer Fig.1(a)]:				
Notation	As per IS: 12953-1990 (Reaffirmed in Oct.,2017), (Cat.I) / (Cat.II), (mm)	As measured, (mm)		Remarks
		<u>Previous Sample</u>	<u>Present Sample</u>	
1	2	3	4	5
A	$683 \pm 1.5 / 825 \pm 1.5$	826	826	Conforms to Cat. II
B	$75 \text{ (min)} / 75 \text{ (min)}$	75	75.5	Conforms to Cat. -I & II
C	$30 \text{ (min)} / 30 \text{ (min)}$	32.17	32.0	Conforms to Cat. -I & II
D \emptyset	$21.79 \text{ to } 22.0 / 27.79 \text{ to } 28.00$	27.82	28.0	Conforms to Cat. - II
E	$39.0 \text{ (min)} / 49.0 \text{ (min)}$	48.89	50.9	Conforms to Cat. -I & II
F \emptyset	$12.0 \text{ (min)} / 12.0 \text{ (min)}$	12.0	12.2	Conforms to Cat. -I & II
G	$15.0 \text{ (min)} / 15.0 \text{ (min)}$	18.24	17.8	Conforms to Cat. -I & II
H \emptyset	$25 \pm 1 / 25 \pm 1$	24.52	24.5	Conforms to Cat. -I & II
J	$80 \pm 1.5 / 80 \pm 1.5$	81.5	80.5	Conforms to Cat. -I & II
No. of holes	$7 / 9$	09	09	Conforms to Cat. -II



3.1.13.3.2 Swinging drawbar : Previous Sample | Present Sample
Not provided

3.1.14 Power take-off shaft:

Type : Type-I, Not 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) : 572 - In low speed range selection
1680 – In high speed range selection
Distance behind rear axle, (mm) : 345 | 350
Engine to PTO speed ratio : 3.67 : 1 – In low speed range selection
1.25 : 1 – In high speed range selection
Whether the PTO shaft is capable of transmitting the full power of engine : Yes

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3.1.14.1 Specification of power take-off shaft: [Refer Fig. 2 (a)]

Specification	As per IS: 4931-1995 (Reaffirmed in 2014), Type-1	As observed		Remarks
		<u>Previous Sample</u>	<u>Present Sample</u>	
1	2	3	4	5
Nominal speed, (rpm)	540 ± 10	540 rpm of PTO corresponds to 1982 rpm of engine.		Conforms
No. of splines	6	6	6	Conforms
Direction of rotation	Clockwise	Clockwise	Clockwise	Conforms
Location	The position of the centre of the end of PTO shaft shall be within 50 mm to right or left of the centre line of the tractor	Centrally located	Centrally located	Conforms
Dimensions, (mm) (See Fig. 2 (a)):				
DØ	34.79 ± 0.06	34.80	34.73	Conforms
dØ	28.91 ± 0.05	28.9	28.92	Conforms
BØ	29.4 ± 0.1	29.32	29.40	Conforms
AØ (Optional)	8.3 ± 0.1	8.3	8.3	Conforms
W	8.69 – 0.09 – 0.16	8.62	8.61	Conforms
a	7	7	7	Conforms
b (optional)	25 ± 0.5	25.5	25.5	Conforms
c	38	38	38	Conforms
X	30°	30°	30°	Conforms
B	76 (min)	84.21	90	Conforms
H*	450 to 675	585	625	Conforms

* May be reduced to 350 mm on tractors with a minimum track setting of 1150 mm or less

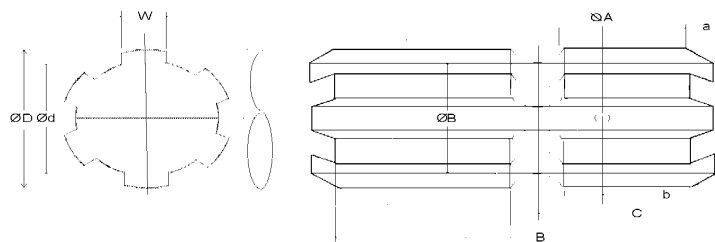


Fig. 2 (a): DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

3.1.14.2 PTO Master Shield:

Dimensions of Power take-Off Shaft, [See Fig. 2(b)]:

Specification	As per IS: 4931-1995 (Reaffirmed in 2014)	As Observed, (mm)		Remarks in case of present model
		<u>Previous Sample</u>	<u>Present Sample</u>	
k	70 (Min.)	75	73	Conforms
m	125 ± 5	130	120	Conforms
n	85 ± 5	85	63	Does not conform
p	285 ± 5	285	280	Conforms
r	76 (Max.)	10	0	Conforms

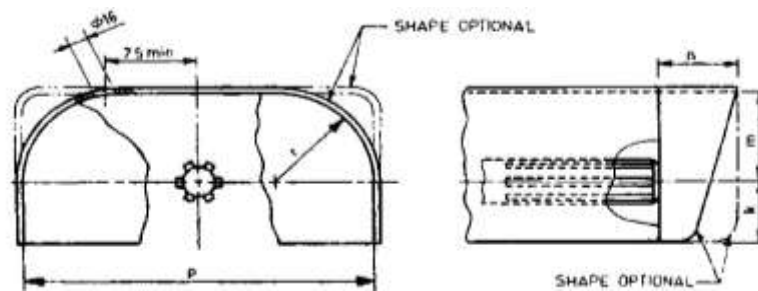


Fig. 2(b): DIMENSIONAL NOTATION FOR PTO SHAFT MASTER SHIELD

		<u>Previous Sample</u>	<u>Present Sample</u>
3.1.15	Towing hitch:		
3.1.15.1	Front	Not Provided	
3.1.15.2	Rear:		
	Type		Clevis
	Location		At rear of differential housing
	Height above ground level, (mm) :		
	- Maximum	678	683
	- Minimum	358	488
	Number of positions	Four	Five
	Type of adjustment	By changing the position of hitch and reversing hitch on its mounting bracket.	By changing the position of hitch on its mounting bracket.
	Distance of hitch point, (mm):		
	- From rear axle centre	450	455
	- From power take-off shaft end		105
	Dia of pin hole, (mm)	29.3	30.9
	Width of clevis, (mm)	75	86
3.1.16	Steering:		
	Make	Rane	Danfoss
	Type	Mechanical, worm and nut with re-circulating ball type, having single drop arm.	Hydrostatic
	Location	On clutch housing	Above bell housing
	Method of operation	Manual, by steering control wheel	
	Diameter of steering control wheel, (mm)	430	420
	Steering oil capacity (l)	0.80	44.5 (common transmission, brake & hydraulic system).
	Oil change period,	After every 1000 hours	First change after 1200 hrs. of operation and subsequently change after every 1200 hrs. Of operation.

3.1.17	Brakes:		
3.1.17.1	Service Brake:	Previous Sample	Present Sample
	Make	: TVS Girling	Brakes India (apa)
	Type	: Mechanical, dry disc brakes	Mechanical, Oil immersed multi discs brake.
	Location	: On differential half axle shaft, outside of differential housing.	On bull pinion shaft
	No. of friction disc(s)	: Two(on each wheel side)	Four (on each wheel side)
	Area of liners, (cm ²)	: 880.5 (on each wheel side)	874.3 (on each wheel side)
	Material of liners	: Asbestos molded SA 36 (apa)	Paper base (apa)
	Method of operation	: Individual or combined pedal operation by right foot of operator	
	Oil capacity, (l)	Not Applicable	44.5 (common transmission, steering & hydraulic system).
	Oil change period	--do--	First change after 1200 hrs. of operation and subsequently change after every 1200 hrs. Of operation.
3.1.17.2	Parking Brake:		
	Type	: Toggle link locking mechanism	
	Location & Method operation of operation	: Service brake act as parking brake when locked in position by a hand lever provided on RHS of the operator's seat.	
3.1.18	Wheel Equipment:		
3.1.18.1	Steered Wheel(s):		
	Make	: MRF Shakti life	CEAT
	Number(s)	:	Two
	Type of tyre(s)	:	Pneumatic, ribbed
	Size	:	6.00 -16
	Ply rating	:	8
	Maximum permissible loading capacity of each tyre recommended for road work, (kgf)	:	535 (apa)
	Recommended inflation pressure, (kPa):		
	- for field work	:	167
	- for transport	:	196
	Track width, (mm)	: 1245(Std.),1355,1445,1485,1595,1695,1795,1805 & 1865	1265 (std.) & 1455
	Method of changing track width	: By extending telescopic axle and reversing wheel disc	By reversing the wheel disc
	Make & size of wheel rim	: WIL, 4.50E x 16	WILP & 4.50E x 16

3.1.18.2	Drive wheel(s):	<u>Previous Sample</u>	<u>Present Sample</u>
	Make	MRF Shakti life	
	Number(s)	Two	
	Type of tyre(s)	Pneumatic, traction	
	Size	13.6 -28	14.9-28
	Ply rating	12	
	Maximum permissible loading capacity of each tyre recommended for road work, (kgf)	1930	
	Recommended inflation pressure, (kPa)		
	- For field work	: 118	
	- For transport	: 137	
	Track width, (mm)	: 1395 (Std.), 1295, 1530, 1575, 1595, 1675, 1765, & 1875	1420 (std.), 1445, 1535, 1625, 1705, 1725, 1815
	Method of changing track width	: By reversing the wheel disc & changing the position of wheel disc on off-set rim lugs.	
	Make & size of wheel rim	: SSWL, W12 x 28	WILP, W13 x 28
3.1.18.3	Wheel base, (mm)	: 1940	1975
	Method of changing wheel base, if any, and range.	: None	
3.1.19	Operator's seat:		
	Make	: Harita seating system ltd.	Polar
	Type	: Cushioned	Cushioned
	Type of suspension	: Helical coil springs	
	Type of dampening	: Hydraulic shock absorber	
	Range of adjustment, (mm):		
	- Vertical	: Nil	
	- Lateral	: Nil	
	- Longitudinal	: ± 65	± 130
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 2014) except the following:		
	<u>Previous sample</u>		<u>Present sample</u>
	i) Width of seat.		i) Longitudinal distance from SIP to the center of steering control wheel.
	ii) Longitudinal distance from SIP to the center of differential lock.		
	iii) Longitudinal distance from SIP to the center of steering control wheel.		
3.1.20.2	Conformity with IS: 6283 (Part 1 & 2)-1998 (Re-affirmed in 2014) :		
	Controls and displays are identifiable with symbols meets the requirements as per IS: 6283 (Part 1&2) – 1998		
3.1.20.3	Conformity with IS: 8133-1983 (Re-affirmed in 2014) :		
	Location and movement of various controls meets the requirement of IS: 8133-1983; except the following:		
	i) Provision for safety start		i) Provision for safety switch against accidental start is not been provided
			ii) The fuel shut-off knob does not remain in stop position

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- 3.1.20.4 Conformity with IS:12239 (Part-1)-1996 (Re-affirmed in 2014) :**
Meets the requirements of IS: 12239 (Part-1)-1996; **except the following:**

i) Provision of spark arresting device in the exhaust system.	i) The spark arrester is not been provided in the exhaust system.
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- 3.1.20.5 Conformity with IS:12239 (Part-2)-1999 (Re-affirmed in 2014) :**
Meets the requirements of IS: 12239 (Part-2)-1999; **except the following:**
Meets the requirements of IS:12239 (Part-2)-1999.

	i) Working clearance around the position control lever is less than the minimum requirement
--	---
- 3.1.20.6 Conformity with IS: 14683 – 1999 (Re-affirmed in 2014) :**
All lighting arrangements meet the requirements of IS: 14683-1999.
- 3.1.20.7 Rear view mirror:**
Rear view mirror has been provided.
- 3.1.20.8 Slow moving emblem:**
Slow moving emblem has been provided.

- 3.1.21 Labelling of tractor as per IS: 10273-1987 (Reaffirmed in 2014):**
Location of labelling plate:- It is riveted on LHS of outside fender and provides the following information:

Name of Manufacturer	M/s. Mahindra & Mahindra Limited, Farm Equipment Sector, India
Make	Mahindra
Model	595 DI Super Turbo
Year of manufacture	FJ (i.e September , 2018)
Chassis Serial Number	MBNADAKALJNF01907
Engine Serial Number	NJF2RHE0017
Maximum P.T.O Power, kW (hp)	32.5 (43.6)
Specific fuel consumption, g/kWh (g/hph)	251 (187)

- | | | |
|-------------------------------------|---|--|
| 3.1.22 Mass of tractor, (kg) | Previous sample
(Unballast): | Present sample
(Standard ballast) |
| - Front : | 760 | 780 |
| - Rear : | 1250 | 1250 |
| - Total : | 2010 | 2030 |
- 3.1.23 Overall dimensions:**
- | | | |
|----------------------------------|---------------------------|--|
| - Length : | 3380 | 3530 |
| - Width : | 1825 | 1830 |
| - Height : | 2165 | 2175 |
| Minimum ground clearance, (mm) : | 335
(Below front axle) | 317 (Below standard ballast at front axle) |
- 3.1.24 Number of external lubricating points:**
- | | | |
|------------------|-----|----|
| Oiling : | Nil | |
| Grease cups : | 02 | 02 |
| Grease nipples : | 18 | 17 |
- 3.1.25 Colour of tractor:**
- | | | |
|--------------------|------------|-----------|
| Engine & Chassis : | Smoke grey | Dark grey |
|--------------------|------------|-----------|
- Sheet metal:**
- | | | |
|---------------------|-----|--------|
| -Bonnet : | Red | Red |
| -Mudguard, : | Red | Red |
| -Wheel rim & disc : | Red | Silver |

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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 of 610 mm radius index, (kmph)	Nominal speed at rated engine speed when fitted with 14.9-28 size tyres of 640 mm radius index, (kmph)	Variation in nominal speed (%) in Supplementary model
		<u>Previous Sample</u>	<u>Present Sample</u>	<u>Previous Sample</u>	<u>Present Sample</u>	
Forward	L1	158.98	163.92	3.04	3.09	1.62
	L2	93.08	99.74	5.19	5.09	-1.96
	L3	64.43	66.35	7.5	7.63	1.70
	L4	43.9	45.33	11.0	11.18	1.61
	H1	54.12	55.75	8.92	9.07	1.65
	H2	31.66	34.00	15.25	14.88	-2.49
	H3	21.94	22.66	22.02	22.39	1.65
	H4	14.99	15.45	32.22	32.78	1.71
Reverse	LR	104.86	117.83	4.61	4.30	-7.21
	HR	35.69	40.17	13.53	12.63	-7.13

3.3. PTO PERFORMANCE TEST

S. No.	Particulars	<u>Previous sample</u>	<u>Present sample</u>
1	Date(s) of test	22.07.2013,23.07.2013,24.07.2013 & 25.07.2014	04.02.2019 & 05.02.2019
2	Tractor run at this Institute prior to start of PTO test, (h)	6.90	2.45
3	Dynamometer test bench used	Fuchino ESF 1000 S Eddy current	SAJ-AG 250 Eddy Current.

Maximum power two hours test under natural ambient condition was conducted. The results of Power take-off performance test under natural ambient & high ambient of **Previous & Present sample** are tabulated in **Table-1** and graphically presented in **Fig. 3, 4 and 5**.

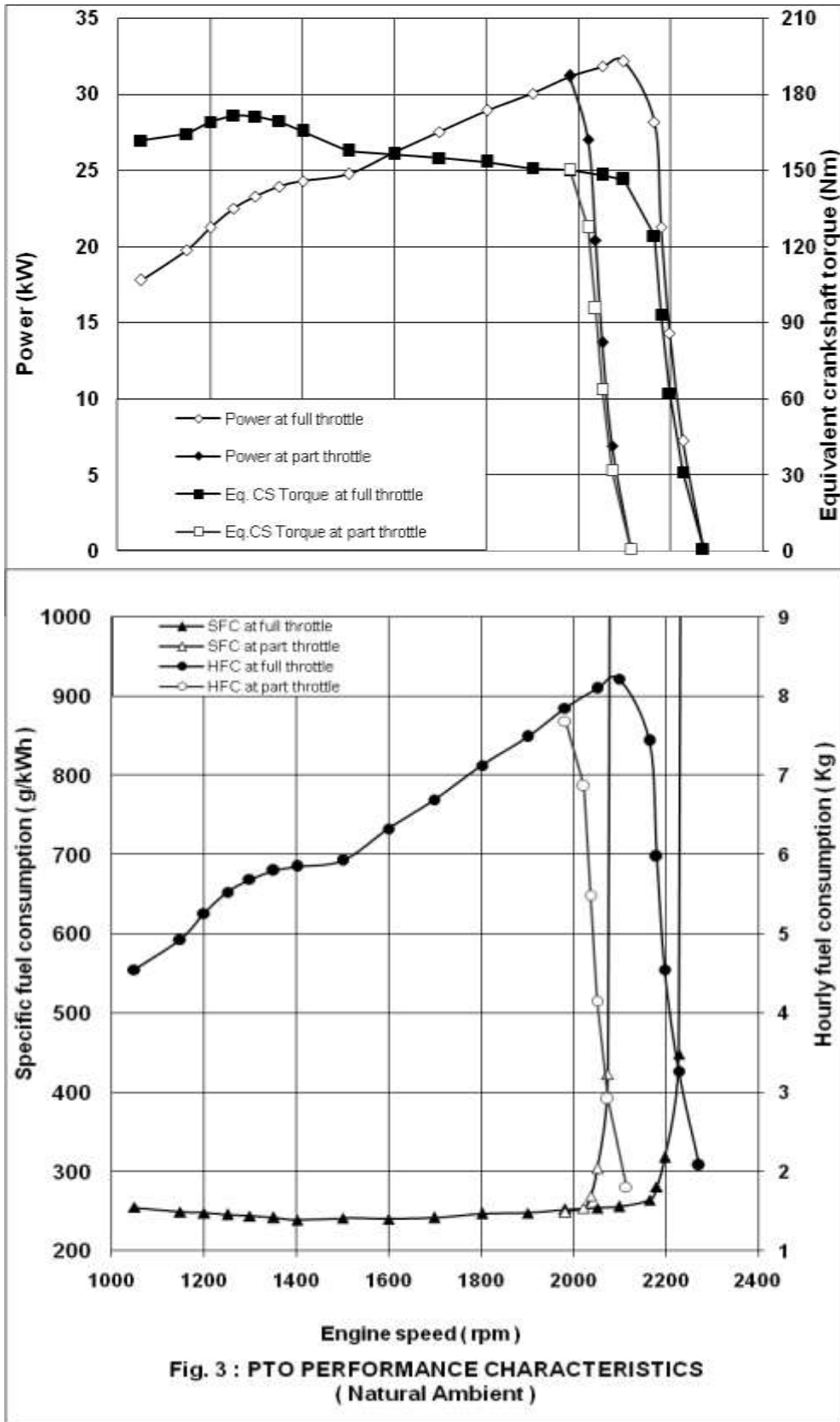
Table-1

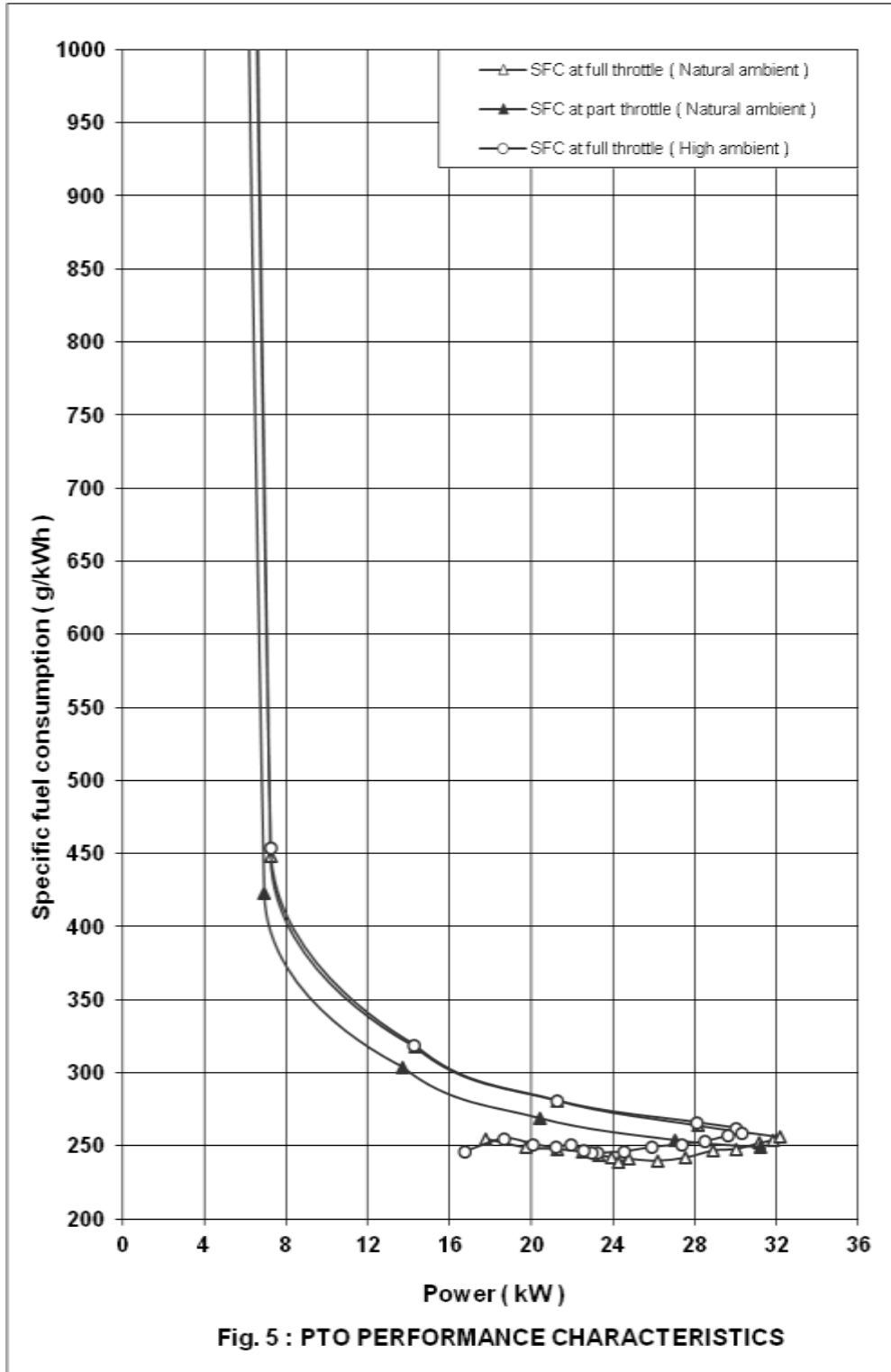
1	Power, (kW)	Speed, (rpm)		Fuel Consumption			Specific energy, (kWh/l)
		PTO	Engine	(l/h)	(kg/h)	(kg/kWh)	
2	3	4	5	6	7	8	
a) Maximum power – 2 hours test (under natural ambient condition):							
Previous sample	32.0	581	2132	9.06	7.57	0.237	3.53
	30.3	583	2140	8.76	7.33	0.242	3.46*
Present sample	32.2	572	2099	9.83	8.22	0.256	3.28
	30.0	572	2099	9.40	7.86	0.262	3.19*
b) Power at rated engine speed (2100 rpm):							
Previous sample	31.5	572	2099	8.82	7.37	0.234	3.57
	29.9	572	2099	8.61	7.20	0.241	3.48*
Present sample	32.2	572	2099	9.83	8.22	0.256	3.28
	30.0	572	2099	9.40	7.86	0.262	3.19*
c) Power at standard power take-off speed (540 ± 10 rpm):							
Previous sample	30.3	540	1982	8.41	7.03	0.232	3.60
	28.4	540	1982	8.13	6.80	0.240	3.49*
Present sample	31.2	540	1982	9.20	7.69	0.246	3.39
	29.6	540	1982	9.09	7.60	0.257	3.26*

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1	2	3	4	5	6	7	8
d) Varying loads at rated engine speed:							
i) Torque corresponding to maximum power available at rated engine speed:							
Previous sample	31.5	572	2099	8.82	7.37	0.234	3.57
Present sample	32.2	572	2099	9.83	8.22	0.256	3.28
ii) 85% of the torque obtained in (i) :							
Previous sample	27.7	590	2165	8.03	6.71	0.242	3.45
Present sample	28.2	590	2165	8.90	7.44	0.264	3.17
iii) 75% of the torque obtained in (ii) :							
Previous sample	21.0	596	2187	6.42	5.37	0.255	3.28
Present sample	21.3	594	2180	7.16	5.98	0.281	2.97
iv) 50% of the torque obtained in (ii) :							
Previous sample	14.2	602	2209	4.92	4.11	0.290	2.88
Present sample	14.3	599	2198	5.44	4.55	0.318	2.63
v) 25% of the torque obtained in (ii):							
Previous sample	7.2	611	2242	3.44	2.88	0.402	2.08
Present sample	7.3	607	2228	3.91	3.27	0.448	1.87
vi) Unloaded:							
Previous sample	1.4	617	2264	2.34	1.96	1.391	0.60
Present sample	0.2	619	2272	2.49	2.08	10.400	0.08
e) Varying loads at standard PTO speed							
i) Torque corresponding to maximum power available at standard PTO speed (540 ± 10 rpm):							
Previous sample	30.3	540	1982	8.41	7.03	0.232	3.60
Present sample	31.2	540	1982	9.20	7.69	0.246	3.39
ii) 85% of the torque obtained in (i) :							
Previous sample	26.2	548	2013	7.38	6.17	0.236	3.55
Present sample	27.0	551	2022	8.22	6.87	0.254	3.28
iii) 75% of the torque obtained in (ii) :							
Previous sample	19.8	552	2027	5.90	4.93	0.249	3.35
Present sample	20.4	555	2037	6.57	5.49	0.269	3.11
iv) 50% of the torque obtained in (ii):							
Previous sample	13.4	561	2061	4.47	3.74	0.279	3.00
Present sample	13.7	559	2052	4.98	4.16	0.304	2.75
v) 25% of the torque obtained in (ii) :							
Previous sample	6.8	567	2083	3.13	2.62	0.387	2.16
Present sample	6.9	565	2074	3.49	2.92	0.423	1.98
vi) Unloaded:							
Previous sample	1.3	574	2108	2.05	1.71	1.355	0.62
Present sample	0.2	567	2114	2.16	1.81	9.050	0.09

* Under high ambient conditions





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Sl. No.	Parameters	Previous Sample		Present Sample	
		<u>Natural ambient</u>	<u>High ambient</u>	<u>Natural ambient</u>	<u>High ambient</u>
i)	-No load maximum engine speed, (rpm)	2264	2257	2272	2264
ii)	-Equivalent crankshaft torque at maximum power, (Nm)	143.3	135.3	146.3	136.7
iii)	-Maximum equivalent crankshaft torque, (Nm)	170.4	160.1	171.6	161.9
iv)	-Engine speed at maximum equivalent crankshaft torque, (rpm)	1237	1299	1251	1251
v)	-Back up torque, (%)	18.9	--	17.3	18.4
vi)	-Smoke level , maximum light absorption coefficient, (m^{-1})	0.27	--	0.39	---
vii)	-Range of atmospheric conditions:				
	Temperature, ($^{\circ}C$)	27 to 30	42 to 45	26 to 30	41 to 46
	Pressure, (kPa)	95.7 to 96.8	96.3 to 98.1	99.5 to 99.9	100.3 to 100.8
	Relative humidity, (%)	63 to 88	35 to 50	46 to 50	23 to 25
viii)	-Maximum temperatures, ($^{\circ}C$):				
	Engine oil	105	115	106	114
	Coolant	92	98	92	104
	Fuel	51	67	50	64
	Air intake	46	61	56	71
	Exhaust gas	572	554	600	608
ix)	-Pressure at maximum power:				
	Intake air, (kPa)	3.2 to 3.5	3.9 to 4.3	7.2 to 8.3	4.6 to 5.0
	Exhaust gas, (kPa)	70.8 to 74.5	66.9 to 69.0	70.8 to 72.0	65.2 to 67.1
x)	-Consumptions:				
	Lub oil, (g/kWh)	--	0.528	--	0.487
	Coolant (% of total coolant capacity)	--	1.73	--	Nil

4. OTHER APPLICABLE TESTS

4.1. BRAKE PERFORMANCE TEST

4.1.1 Service brake:

4.1.1.1 Cold brake test:

Date of test(s) : 08.02.2019 & 13.02.2019
 Type of Track : Concrete
 Maximum attainable speed (kmph):
 -Without Ballast : 35

		At maximum attainable speed			
Unballasted tractor	Braking device control, force (N)	414	341	268	195
	Mean deceleration, (m/sec ²)	3.61	3.31	3.10	2.50
	Stopping distance, (m)	13.28	14.30	15.26	18.90
Road ballasted tractor	Braking device control, force (N)	437	374	312	249
	Mean deceleration, (m/sec ²)	3.50	3.29	3.08	2.50
	Stopping distance, (m)	13.81	14.35	15.35	18.90
		At 25 kmph travel speed			
Unballasted tractor	Braking device control, force(N)	304	271	238	206
	Mean deceleration, (m/ sec ²)	3.17	3.10	2.98	2.50
	Stopping distance, (m)	7.50	7.79	8.08	9.65
Road ballasted tractor	Braking device control, force (N)	340	305	269	234
	Mean deceleration, (m/sec ²)	3.24	3.02	2.79	2.50
	Stopping distance, (m)	7.57	7.99	8.65	9.65

4.1.1.2 Brake fade test:

		At maximum attainable speed			
Braking device control force (N)		448	384	320	256
Mean deceleration, (m/ sec ²)		3.41	3.23	3.07	2.50
Stopping distance, (m)		13.88	14.62	15.40	18.90
		At 25 kmph travel speed			
Braking device control force,(N)		378	353	328	303
Mean deceleration, (m/ sec ²)		3.19	2.90	2.6	2.50
Stopping distance, (m)		7.68	8.32	9.07	9.65

Maximum deviation of tractor from its original course, (m) : None
 Abnormal vibration : None
 The brakes were heated by : Self braking

4.1.2 Parking brake test:

Particulars	18 percent slope		12 percent slope with trailer of 2.01 tones.	
	Up	Down	Up	Down
Braking device control force, (N)	245	256	207	245
Efficacy of parking brake	-----Effective-----			

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4.2. TURNING ABILITY

Characteristics	Minimum turning diameter,(m)		Minimum clearance diameter,(m)	
	LHS	RHS	LHS	RHS
Brakes released	7.18	6.87	7.54	7.19
Brake applied	5.97	5.91	6.23	6.15

5. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

S. No.	Adjustments/Defects/Breakdowns/Repairs	Tractor run hours
1.	During PTO test at full load varying speed under natural ambient condition governor hunting occurred at 1160 to 1250 of engine rpm.	7.9

6. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

6.1 Evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of IS: 12207-2014 for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

S. No.	Characteristic	Category (Evaluative/ Non Evaluative)	Requirements as per IS: 12207-2014	Values declared by the applicant (D) / Requirement (R)		As observed		Whether meets the requirements (Yes/No)
				Previous Sample	Present Sample	Previous Sample	Present Sample	
1	2	3	4	5 a	5 b	6 a	6b	7
6.1.1	PTO Performance :							
a)	Maximum power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: -5 / +10% for PTO power >26 kW. -7.5/+10% for PTO power ≤ 26 kW or -5 / +10% for Engine power >26 kW. -7.5/+10% for Engine power ≤ 26 kW	32.5 (D)	32.5 (D)	32.0	32.2	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	32.5 (D)	32.5 (D)	31.5	32.2	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Non Evaluative	+ 5%	251 (D)	251 (D)	237	256	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	207 (D)	207 (D)	170	171.6	No
e)	Back-up torque, percent	Non Evaluative	10 percent, min.	13(D)	13(D)	18.9	18.4	Yes

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1	2	3	4	5 a	5 b	6 a	6b	7	
f)	Maximum operating temperature(°C)								
	1)	Engine oil	Non Evaluative	The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	129 (D)	129 (D)	115	114	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.	112 (D)	112 (D)	98	104	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	0.15% (D)	1 % of SFC (D)	0.52 8	0.48 7	Yes	
h)	Smoke level, m ⁻¹	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hatridge value (As per CMVR)	0.2 per meter (D)	0.2 per meter (D)	0.27	0.39	Yes	
6.1.2 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)	7.33 to 9.65	7.57	Yes
	2)	Hot brake	Evaluative	10	10 (R)	10 (R)	7.18 to 9.65	7.68	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)	383 to 418	234 to 303	Yes	
c)	Whether parking brake is effective at a force of 600 N at foot pedal(s) or 400 N at hand lever	Evaluative	Yes/No	Yes (R)	Yes (R)	Yes	Yes	Yes	
6.1.3 Safety features :									
a)	Guards against moving and hot parts	Evaluative	Belt drives, pulley, silencer, hydraulic pipes (As per IS 12239 (part 2)	-	-	Meets the requirement		Yes	
b)	Lighting arrangement	Evaluative	As per CMVR	-	-	Meets the requirement		Yes	
c)	Seating requirement (Tractors having more than 1150 mm rear track width)	Non-Evaluative	Should meet the requirements of IS 12343 (as amended from time to time)	-	-	Does not meets the requirement		No	
d)	Technical requirements for PTO shaft	Non-Evaluative	Should meet the requirements of IS 4931 (as amended from time to time)	-	-	Meets the requirement		Yes	
e)	Dimension of three point linkage	Non-Evaluative	Should meet the requirements of IS 4468 (part 1) (as amended from time to time)	-	-	Does not meets the requirement		No	

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1	2	3	4	5 a	5 b	6 a	6b	7
f)	Specification of linkage	Non-Evaluative	Should meet the requirements of IS 12953 and IS 12362 (part 3) (as amended from time to time)	--		Meets the requirement		Yes
	Swinging drawbars					Not Provided		--
6.1.4	Labelling of tractors (Provision of labelling plate): Present Sample							
	i) Make	Evaluative	Should conform to the requirements of CMVR along with declared value of PTO hp	--	Mahindra		Yes	
	ii) Model	Evaluative		--	595 DI Super Turbo		Yes	
	iii) Year of manufacture	Evaluative		--	FJ (i.e. September, 2018)		Yes	
	iv) Engine serial number	Evaluative		--	NJF2RHE0017		Yes	
	v) Chassis serial number	Evaluative		--	MBNADAKALJNF0 1907		Yes	
	vi) Declaration of PTO power, kW	Evaluative		--	32.5		Yes	

6.1.5 Salient Observations:

6.1.5.1 Laboratory tests:

6.1.5.1.1 PTO Performance:

- i) The maximum PTO power was recorded as **32.2 kW** against the declaration of **32.5 kW**, which meets the requirement of IS: 12207-2014 with regard to tolerance limit.
- ii) The specific fuel consumption corresponding to maximum power was recorded as **256 g/kWh** against the declaration of **251 g/kWh**, which is within the tolerance limit of IS: 12207-2014.
- iii) The maximum equivalent crankshaft torque was recorded as **171.6 N-m** against the declaration of **207 N-m**, which does not meet the requirement of IS: 12207-2014. This should be recommended to looked into for necessary corrective action.
- iv) The backup torque is 18.4 %.
- v) The drop of 6.8 % in max. PTO power was observed during natural and high ambient conditions. This should be looked into for necessary corrective action.
- vi) During PTO performance test at full load varying speed test under natural ambient condition governor hunting was occurred at 1160 to 1250 of engine rpm. This should be recommended to looked into for necessary corrective action.

6.1.5.1.2 Three Point Linkage:

- i) The dimensions of parameters at lower hitch pin hole (width of ball) and lateral distance from lower hitch point to centre line of tractor does not meet the requirement of IS:4468 (Part-I) – 1997. This should be looked into for necessary corrective action.

6.1.5.1.3 Operator's seat:

Distance from seat index point to centre of steering control wheel does not meet the requirements of IS: 12343-1998. This should be looked into for necessary corrective action.

6.1.5.2 Maintenance / Service problems:

No noticeable maintenance and service problems was observed during the test.

6.1.5.3 Recommendation with regard to safety on tractor:

The following requirements, inter-alia, may be considered for incorporation on the tractor as per relevant Indian Standards:

- i) Provision of spark arresting device in exhaust system.

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- ii) The working clearance around main position control lever is less than the minimum requirement
- iii) There should be provision in fuel shut-off to remain to “Stop” position
- iv) There should be provision against accidental start of tractor.

6.1.5.4 Adequacy of Literature:

6.1.5.4.1 The following literatures were supplied with the test tractor for reference during the test:-

- a) Operator’s manual of Mahindra 595 DI Super Turbo Tractor model
- b) Service manual of Mahindra 595 DI Super Turbo Tractor model
- c) Parts Catalogue of Mahindra 595 DI Super Turbo Tractor model

6.1.5.4.2 The printed literature supplied with the test sample is in English. The literature may be brought out as per IS: 8132-1999 (Reaffirmed in march 2009) for the guidance of user and service personal in national as well as other regional languages.

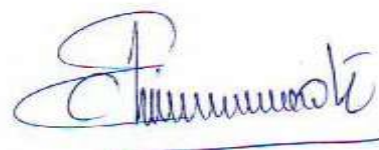
7. CITIZEN CHARTER

Duration of Test	Test duration under citizen charter	Whether the report released within time frame given in the citizen charter	Remark
6 Months (January, 2018 to June, 2019)	10 Months	Yes	None

TESTING AUTHORITY:



**C.S. RAGHUWANSHI
AGRICULTURAL ENGINEER**



**C.V. CHIMOTE
TEST ENGINEER**



**J.J.R. NARWARE
DIRECTOR**

The report compiled by: **Shri Vithato Keyho**, Senior Technical Assistant.

8. APPLICANT’S COMMENTS

Para No.	Our Reference	Applicant’s comments
8.1	6.1.5.1 (iii,v & vi),6.1.5.1.2, 6.1.5.1.3,6.1.5.1.4, 6.1.5.3 (i,ii,iii & iv)	Observations will be studied and necessary action will be incorporated.

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ANNEXURE – I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS:	HOURS
1.	Running-in	--
2.	PTO performance test	12.1
3.	Nominal speed test	1.1
4.	Brake performance test	2.0
5.	Turning Ability Test	0.3
B	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	0.3
TOTAL:		15.8