व्यावसायिक परीक्षण रिपोर्ट वैरिएंट (प्रथम बैच)
COMMERCIAL TEST REPORT VARIANT
(FIRST BATCH TEST)

संख्या / No. : **T- 1527/2055/2021**
माह / Month : **April, 2021**

(यह परीक्षण रिपोर्ट **30/04/2026** तक वैध है। / **THIS TEST REPORT IS VALID UPTO:30/04/2026)**

MAHINDRA, 605 DI MS TRACTOR
(BRAND NAME : ARJUN NOVO)

सत्यमेव जयते

भारत सरकार
कृषि एवं किसान कल्याण मंत्रालय
कृषि, सहकारिता एवं किसान कल्याण विभाग,
मशीनीकरण एवं प्रौद्योगिकी प्रभाग
GOVERNMENT OF INDIA
MINISTRY OF AGRICULTURE AND FARMERS WELFARE
DEPARTMENT OF AGRICULTURAL, COOPERATION & FARMER'S WELFARE,
MECHANIZATION & TECHNOLOGY DIVISION

केन्द्रीय कृषि मशीनरी प्रशिक्षण एवं परीक्षण संस्थान
ट्रैक्टर नगर, बुदनी (म.प्र.) 466 445
CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE
(An ISO 9001: 2015 Certified Institute)
TRACTOR NAGAR, BUDNI (M.P.) 466445

E-mail: fmti-mp@nic.in **Web site:** http://www.fmttibudni.gov.in

Telephone: 07564-234729, 234743

T- 1527/2055/2021	MAHINDRA, 605 DI MS TRACTOR COMMERCIAL - VARIANT (First Batch Test)
	THIS TEST REPORT IS VALID UPTO: 30/04/2026

Manufacturer : **M/s. Mahindra & Mahindra Ltd.**
(Farm Equipment Sector)
Mahindra Research Valley
Mahindra World City, Plot No. 41/1, Anjur P.O.,
Chengalpattu , Kanchipuram District ,
Tamilnadu,India – 603204

Month: April	Test Report No. T- 1527/2055/2021	Year: 2021

सत्यमेव जयते

GOVERNMENT OF INDIA
CENTRAL FARM MACHINERY TRAINING & TESTING INSTITUTE
TRACTOR NAGAR, BUDNI (MADHYA PRADESH) 466445, INDIA

E-mail: fmti-mp@nic.in Web site: http://www.fmttibudni.gov.in

Telephone : 07564-234729, 234743

Type of Test	:	**COMMERCIAL VARIANT (First Batch Test)**
Test code/Procedure	:	IS: 5994 -1998 (Reaffirmed in 2014) and IS: 12207-2019
Period of Test	:	**November,2020 to February,2021**
Test Report No	:	**T- 1527/2055/2021**
Month/Year	:	**April, 2021**

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 pertains to the particular machine submitted by the applicant for tests.

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 batch test report on variant model "**Mahindra, 605 DI MS**" tractor and therefore, should be read in conjunction with the Test Report of commercial variant model i.e. "**Mahindra, 605 DI MS**" tractor bearing report No. **T-1067/1592/2017** released in **January, 2017**, Base model Commercial First Batch Test Report of "**Mahindra, 605 DI PS**" bearing report No. **T- 1447/1974/2020** released in **June, 2020.**

vi) This report form part-I of test report and report on User's Survey Forming part-II shall be released later.

SELECTED CONVERSIONS

SELECTED CONVERSIONS		
S. 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

CONTENTS

Manufacturer : **M/s. Mahindra & Mahindra Ltd.**
(Farm Equipment Sector)
Mahindra Research Valley
Mahindra World City, Plot No. 41/1, Anjur P.O.,
Chengalpattu , Kanchipuram District ,
Tamilnadu,India - 603204

Location of manufacturing plants (apa) :

i) **M/s. Mahindra & Mahindra Ltd.**
(Farm Equipment Sector)
Mahindra Research Valley
Mahindra World City, Plot No. 41/1, Anjur P.O., Chengalpattu , Kanchipuram District , Tamilnadu,India – 603204

ii) **Mahindra & Mahindra Ltd.**
(Farm Equipment Sector)
Akurli Road, Kandivli (E)
Mumbai – 400 101

iii) **Mahindra & Mahindra Ltd.**
(Farm Equipment Sector)
Hingna Road, Hingna MIDC
Nagpur– 440 016.

iv) **Mahindra & Mahindra Ltd.**
(Farm Equipment Sector)
Agri Business Development Center,
Khatima Panipat Highway, Udham Singh Nagar, Vil. Lalpur, Tehsil-Kichha,
Rudrapur – 263 153

v) **Mahindra & Mahindra Ltd.**
(Farm Equipment Sector)
Agri Development Center, Vil.- Mehla,
Tehsil – Dudu, Jaipur- Ajmer Road,
Jaipur– 303 007

vi) **Mahindra & Mahindra Ltd.**
(Farm Equipment Sector)
Near Bidar "T" Junction , Mahindra Nagar,
Zaheerabad- 502 220
Medak District, Telangana

Selected for test by : The manufacturer
Place of running-in : At manufacturer work place
Duration of said running-in, (h):
- Engine : 15
- Transmission : 32

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 tractor model **"Mahindra 605 DI MS"** tractor had undergone Commercial (Variant) test vide test report number **T-1067/1592/2017 (January, 2017)** derived from the base model **"Mahindra 605 DI PS"** tractor tested vide test Report **No. T-954/1472/2015 (February, 2015)** and subsequently tested under Batch test vide test report number **T-1447/1974/2020 (June, 2020)**.

The variant models derived on the basis of **provision of oil cooler** (in base model) to **oil cooler removed** (in variant model) as per Table 2 of Sl.No. (vi) Of IS: 12207-2019.

The major features of **Base model** and **Variant model** are listed below:

S. No.	Parameters	Base Model (Test Report No. T-1447/1974/2020, June, 2020)	Variant Model
1	2	3	4
1.	Make & model of tractor	Mahindra & 605 DI PS	Mahindra & 605 DI MS
2.	Make & model of Engine	Mahindra & MSI 452 3A	Mahindra & MSI 450 3A
3.	Maximum speed at no load, rpm	2400 to 2500	2250 to 2350
4.	Low idle speed, rpm	750 to 850	800 to 900
5.	Governor range of engine speed, rpm	750 to 2500	800 to 2350
6.	Model/Group combination No. of Fuel Injection Pump	F002A3Z007, PES4A85D320RS3500	F002A2Z016, PESA950320RS2000
7.	Model/Group combination No. of governor	RSV400…1050A2C1742R	RSV400…1050A2C1790R
8.	**Fuel injectors:**		
	- Holder Number	F002C70552	0432193410
	- Manufacturer's production pressure setting, (MPa)	25.0 + 1.0	25.0 + 0.8
9.	Exhaust gas recirculation	EGR Provided	**EGR Not Provided**
10.	**Lubricating system:**		
	Total lub oil capacity, (l)	9.30	9.75
	Type of cooling device, (if any)	Provided (Oil cooler)	**Not provided (Oil cooler removed)**
	Pressure release setting, (kPa)	392.27 ± 49.03	350 to 450 (apa)
	Minimum permissible pressure, (kPa)	100	200 (apa)
11.	**Cooling system:**		
	Brand name of the coolant	Ethylene Glycol	Mobile Coolz Coolant Additive (apa)
	Bare radiator capacity, (l)	4.1	4.3
	Capacity of expansion tank, (l)	1.0	1.2
	Total coolant capacity, (l)	11.4	9.0

1	2	3	4
14.	**Wheel Equipment:**		
	Front track width, (mm)	1390 (std.), 1450, 1480 & 1550	1400 (std.), 1460, 1470, 1480, 1560 & 1570
	Method of changing track width	By reversing and changing the position of wheel rim.	By extending the telescopic front axle & reversing the wheel disc.
	Rear track width, (mm)	1440, 1450, 1530(std.), 1560, 1620, 1730 & 1840.	1340, 1420, 1460, 1540 (Std.), 1620, 1700, 1720 & 1820.
15.	Overall dimensions (Length / Width / Height), mm	3610 / 1950 / 2160	3660 / 1945 / 2145
16.	Unballasted mass, (kg) Front / Rear / Total	905 / 1505 / 2410	935 / 1450 / 2385

Subsequent to the examination of the case in light of table-2 & 3 of Indian Standard IS 12207-2019, the following tests were considered to be carried out :

- Specification checking
- Nominal speed test
- PTO power performance 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	SAE 15W40 Maximile	As recommended
2.	Gearbox, differential, rear axle, rear final drive, brake, steering and hydraulic system	TRACT ELF MM	Oil originally filled in the tractor systems were not changed
3.	Grease	MP3 Lithium base	MP Grease

3. ESSENTIAL TESTS

3.1 SPECIFICATIONS

3.1.1 Tractor:

Make	:	Mahindra
Model	:	605 DI MS
Brand name	:	Arjun Novo
Type	:	Four wheeled, Rear-wheels driven, Unit construction, General purpose, Agricultural Tractor.
Month & Year of manufacture	:	10 / 20
Chassis number	:	MBNWHBDKELNG00003
Country of origin	:	India

3.1.2 Engine:

Make	:	Mahindra
Model	:	MSI 450 3A
Type	:	Four stroke, naturally aspirated, liquid cooled, direct injection, diesel engine.
Serial number	:	NLG4WNE0014
Year of manufacture	:	2020
Country of origin	:	India

3.1.2.1 Engine speed (rpm), (Manufacturer's recommended production settings):

- Maximum speed at no load	:	2250 to 2350
- Low idle speed	:	800 to 900
- Speed at maximum torque	:	1100 to 1300

Rated speed, (rpm):

- For PTO use	:	2100
- For drawbar use	:	2100

3.1.3 Cylinder & Cylinder Head:

Number	:	Four
Disposition	:	Vertical, Inline
Bore/stroke, (mm)	:	96 / 122
Capacity as specified by the applicant, (cc)	:	3532
Compression ratio	:	18.3 (±0.5): 1
Type of cylinder head	:	Monoblock
Type of cylinder liners	:	Wet, replaceable
Type of combustion chamber	:	Re-entrant bowl cavity on piston crown.
Arrangement of valves	:	Overhead, Inline

Valve clearance (cold/hot):

- Inlet valve, (mm)	:	0.3/0.3
- Exhaust valve, (mm)	:	0.4/0.4

3.1.4 Fuel System:

Type of fuel feed system	:	Gravity and force feed

3.1.4.1 Fuel tank:

Capacity, (l)	:	60.0
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	:	Plunger with hand primer
Model/Group combination No.	:	FP/KSG22AD105, F002A50040
Provision of sediment bowl	:	Provided
Method of drive	:	Through cam shaft of fuel injection pump

3.1.4.4 Fuel filters:

Make	:	Bosch, India
Model/Group combination No.	:	F002 H20 117
Number	:	Two

Type of elements:

- Primary	:	Cloth
- Secondary	:	Paper
Capacity of final stage filter, (l)	:	0.40

3.1.4.5 Fuel Injection pump:

Make	:	Bosch, India
Model/Group combination No.	:	F002A2Z016, PES4A95D320RS2000
Type	:	Inline, plunger
Location	:	On LHS of engine
Serial number	:	07677164
Method of drive	:	Through timing gears

3.1.4.6 Fuel injectors:

Make	:	Bosch, India
Model/ group combination no. :		
- Holder Number	:	0432193410
- Nozzle Number	:	DSLA147P1379
Type	:	Multi holes (Six holes)
Manufacturer's production pressure setting, (MPa)	:	25.0 + 0.8
Injection timing	:	3.5 ± 1 degree before TDC
Firing order	:	1- 3- 4- 2

3.1.4.7 Governor:

Make	:	Bosch, India
Model/Group combination No.	:	RSV400…1050A2C1790R
Type	:	Mechanical, centrifugal, variable speed
Rated engine speed, (rpm)	:	2100
Governed range of engine speed, (rpm)	:	800 to 2350

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)	:	2.0 to 2.1

Details of elements:	:	**Primary**	**Secondary**
No. of elements	:	One	One
Type of elements	:	Polyester felt	Cellulose fiber
Size, (mm) (OD/ID)	:	162.5 / 95.7	91.9 / 76.2
Length	:	345	340

Provision of dust unloading valve	:	Provided
Provision of air flow restriction indicator	:	Provided on dashboard
Service / maintenance schedule	:	Cleaning of primary element at 100 hrs. of operation/ earlier if required in arduous condition& then at every 500 hrs. of operation. Replace primary element at every 900 hrs. of operation or 3 cleaning of primary filter element. Replace secondary (safety cartridge) element change at every 2500 hours or 3 replacements of primary filter element.

3.1.6 Exhaust System:

Type of silencer	:	Updraft (Cylindrical)

Position of silencer outlet with respect to SIP, (mm):

- Vertical	:	675
- Longitudinal	:	1535
- Lateral	:	545 (on RHS)
Range of exhaust gas pressure at maximum power (kPa)	:	9.9 to 10.1
Provision of spark arresting device	:	**Not provided**
Provision against entry of rain water	:	A bend is provided at the top of silencer

3.1.6.1 Turbocharger / EGR : Not Provided

3.1.7 Lubricating system:

Type	:	Forced feed-cum-splash
Oil sump capacity,(l)	:	9.40
Total lub oil capacity, (l)	:	9.75
Oil change period	:	First change after 100 hours and subsequently after every 400 hours of operation.
Type of cooling device, (if any)	:	**Not provided**

3.1.7.1 Filters:

Type	:	Full flow, Spin-on, paper element
Number	:	One

3.1.7.2 Pump:

Type	:	Gear
Method of drive	:	Through timing gear
Pressure release setting, (kPa)	:	350 to 450 (apa)
Minimum permissible pressure, (kPa)	:	200 (apa)

3.1.8 Cooling system:

Type	:	Forced circulation of coolant and water
Brand name of the coolant	:	Mobile Coolz Coolant Additive (apa)
Coolant water ratio	:	0.05:1 (apa)

3.1.8.1 Details of Pump : Centrifugal, semi open impeller having seven vanes of 91 mm outer diameter and driven through crankshaft pulley by a "V" belt common to alternator.

3.1.8.2 Details of fan : Suction type, having seven polypropylene blades of 455 mm diameter and mounted in water pump shaft.

Means of temperature control	:	Thermostat
Bare radiator capacity, (l)	:	4.3
Coolant expansion tank capacity,(l)	:	1.2
Total coolant capacity, (l)	:	9.0
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

3.1.10 Electrical System:

3.1.10.1 Battery:

Make and model	:	Exide Express & MHD880
Type	:	Lead Acid
Capacity and rating	:	12V, 88 Ah at 20 hour discharge rating
Location	:	On RHS of clutch housing in separate metallic box.

3.1.10.2 Starter:

Make	:	LUCAS TVS
Model	:	M14
Type	:	Pre-engaging , solenoid operated
Power rating	:	12V, 2.2 kW
Serial number	:	26641072

3.1.10.3 Generator:

Make	:	LUCAS TVS
Model	:	SIA 114
Type	:	Alternator
Serial number	:	26021693
Output rating	:	12V,45 Amps
Method of drive	:	Through crank shaft pulley by a "V" belt common to water pump pulley

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)
Present Sample:				
Front Lights:				
- Head lights	2,12V,60/55W	1220	165 x 110	827
- Parking lights	2, 12V, 5W	1420	60 x 75	335
- Turn Indicators-cum-hazard lights	2, 12V,21W	1420	60 x 75	225
- Reflector	2	1420	50 x 50	280
Rear lights:				
- Tail-cum-brake light	2, 12V, 21/5W	1420	60 x 75	345
- Turn Indicators-cum-hazard lights	2,12V, 21W	1420	60 x 75	230
- Reflectors (Red)	2	1420	50 x 50	290
- Plough light (on RHS mudguard)	1, 12V, 55W	1430	110 Ø	600
- Registration plate Light	1, 12V, 5W	1260	30 Ø	972

3.1.10.6 Main switch : Key turn type, having three position viz:
i) OFF
ii) 'Circuit' ON + Dashboard light
iii) START

3.1.10.7 Light switch : Rotary type having six positions viz.
i) OFF
ii) Parking light + Dash board light
iii) Head light (short beam) + Position II
iv) Head light (long beam) + Position II
v) Turn indicator switch
vi) Horn push button

3.1.10.8 Horn:

Make : Minda

Type : 12 V, 2B, Electromagnetically vibrated diaphragm type

Location : In front of radiator, under the bonnet

3.1.10.9 Fuse box : Contains fifteen number of fuses of following capacity:

Capacity	15 A	10 A	05 A
No. of fuse	04	06	05

3.1.10.10 Details of other electrical accessories:

3.1.10.10.1 Seven pin trailer socket : Provided

3.1.10.10.2 Starting safety switch : Engine will not start unless the main engaging gear lever is in neutral position.

3.1.10.10.3 Flasher Unit:

Make	:	Interface
Capacity:		
- Turn signal	:	12V, 21W x 2 +2W x 1
- Hazard signal	:	12V, 21W x 4 + 2Wx2
Flashes/min.	:	85

3.1.11 Instrument panel details:

i) Engine speed cum cumulative digital run hour meter (0-25 x 100 rpm)
ii) Water temperature gauge (with colored zone)
iii) Combination light switch (Rotary type)
iv) Fuel level gauge(with colored zone)
v) Battery charging warning indicator light
vi) Lubrication oil pressure indicator
vii) Main gear Neutral indicator
viii) Air cleaner clogging indicator
ix) Turn signal cum Hazard light indicator
x) Parking brake light indicator
xi) Fuel low level indicator
xii) Head lamp (Long beam) 'ON' indicator light
xiii) Water temperature indicator
xiv) General warning indicator
xv) Main switch (key- turn type)
xvi) Hazard light switch
xvii) Horn push button
xviii) Plough light switch
xix) Hand accelerator lever
xx) Rear view mirror
xxi) Steering control wheel
xxii) Re-set knob push type
xxiii) Mobile charging socket
xiv) Fuel shut off knob

3.1.12 Transmission System:

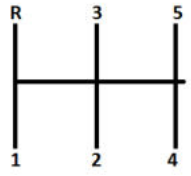
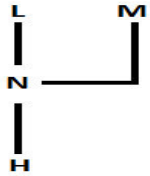
3.1.12.1 Clutch:

Make	:	Luk India (apa)
Type	:	Dual, dry friction plate and pads diaphragm type
No. of friction plate(s)	:	Two
Materials	:	Ceramettalic (apa)
Size, {OD/ID} (mm):		
- Transmission	:	310 / 197Φ
- PTO	:	280 / 165 Φ
Method of operation:		
- Transmission	:	By depressing foot pedal, provided on LHS of operator's seat
- PTO	:	By hand operated clutch lever, provided on LHS of operator's seat

3.1.12.2 Gear box:

Make	:	Mahindra
Type	:	Mechanical, combination of constant and partial synchromesh gears

No. of speeds:

- Forward	:	15
- Reverse	:	03
Location of gear shifting levers	:	Side shifting, main gear shifting lever at RHS and range selection lever at LHS of operator's seat.
Gear shifting pattern	:	  <u>Main gear shifting lever</u> <u>Range selection lever</u>
Oil capacity (l)	:	40.4 (Common with differential, rear axle, rear final drive, hydraulic, steering and brake system)
Oil changing period	:	After every 1200 hours of operation.

3.1.12.3 Rear differential:

Type	:	Crown wheel & bevel pinion with differential unit accommodated inside the differential housing.
Reduction through crown wheel & bevel pinion	:	3.692:1(48/13T)
Oil capacity (l)	:	40.4 (Common with gearbox, rear axle, rear final drive, hydraulic, steering and brake system)
Oil changing period	:	After every 1200 hours of operation.

Differential lock:

Type	:	Dog clutch
Location	:	Planetary sun shaft near differential housing
Method of drive	:	By depressing a foot pedal provided in RHS of operator's seat.

3.1.12.4 Rear axle & final drive:

Type	:	Planetary reduction unit
Reduction through final drive	:	7.0:1 (15T Sun, 37T Planets & 90T for Ring)
Oil capacity of final drive, (l)	:	40.4 (common with gear box, differential, hydraulic, steering and brake system)
Oil changing period	:	After every 1200 hours of operation.

3.1.13 Power lift (Hydraulic system):

- Make	:	Mahindra (apa)
- Type	:	Open center, live, ADDC
- No. and type of internal cylinder	:	One, single acting
-Type of linkage lock for transport	:	Hydraulic, isolated valve in fully closed position act as transport lock.

3.1.13.1 Hydraulic pump:

- Make & Model	:	Dynamatic & None
- Type	:	Gear, tandem
- Location & drive	:	On RHS of engine & through timing gears

No. & Type of filter	:	a) One strainer inside the differential housing b) One full flow spin on paper element c) Orifice filter on distributor
Hydraulic oil capacity, (l)	:	40.4 (common with transmission, steering and brake system)
Oil change period	:	After every 1200 hours of operation.
Provision for external tapping	:	Provided
Details of control	:	i) Position control lever (black) ii) Draft control lever (red) iii) Isolated valve knob on distributor iv) Response control knob
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
I.	**Upper hitch points:**				
	a)	Dia of hitch pin hole	19.30 to 19.50 / 25.70 to 25.90	25.9	Conforms to Cat. II
	b)	Width of ball	44.0 (max.) / 51.0 (max)	38.8	Conforms to Cat. I & II
II.	**Lower hitch points:**				
	a)	Dia of hitch pin hole	22.40 to 22.65 / 28.70 to 29.00	28.9	Conforms to Cat. II
	b)	Width of ball	34.8 to 35.0 / 44.8 to 45.0	44.9	Conforms to Cat. II
III.	Lateral distance from lower hitch point to centre line of tractor		359 / 435	435	Conforms to Cat.II
IV.	Lateral movement of lower hitch points		100 (min) / 125 (min)	120	Conforms to Cat.I
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	475	Conforms to Cat.I
VI.	Transport height		820 (min) / 950 (min)	940	Conforms to Cat.I
VII.	Power range (Without force)		560 (min) /650 (min)	685	Conforms to Cat. I & II
VIII.	Leveling adjustment		100 (min) / 100 (min)	450	Conforms to Cat. I & II
IX.	Lower hitch point tyre clearance		100 (min) / 100 (min)	210	Conforms to Cat. I & II
X.	Lower hitch point height		200 (max) / 200 (max)	125	Conforms to Cat. I & II

3.1.13.3 Drawbar:

3.1.13.3.1 Linkage Drawbar [Refer Fig. 1]:

Notation	As per IS: 12953-1995 (Reaffirmed in October, 2017), (Cat. I)/(Cat.II) (mm)	As measured, (mm)	Remarks
A	683 ± 1.5 / 825 ± 1.5	825	Conforms to Cat.- II
B	75 (min) / 75 (min)	76	Conforms to Cat. – I & II
C	30 (min) / 30 (min)	35	Conforms to Cat. – I & II
D∅	21.79 to 22.00 / 27.79 to 28.00	27.90	Conforms to Cat. – II
E	39.0 (min) / 49.0 (min)	54.9	Conforms to Cat. – I & II
F∅	12.0 (min) / 12.0 (min)	12.4	Conforms to Cat. – I & II
G	15.0 (min) / 15.0 (min)	16.6	Conforms to Cat. – I & II
H∅	25 ± 1 / 25 ± 1	25	Conforms to Cat. – I & II
J	80 ± 1.5 / 80 ± 1.5	80.3	Conforms to Cat. – I & II
No. of holes	7 / 9	09	Conforms to Cat. – II

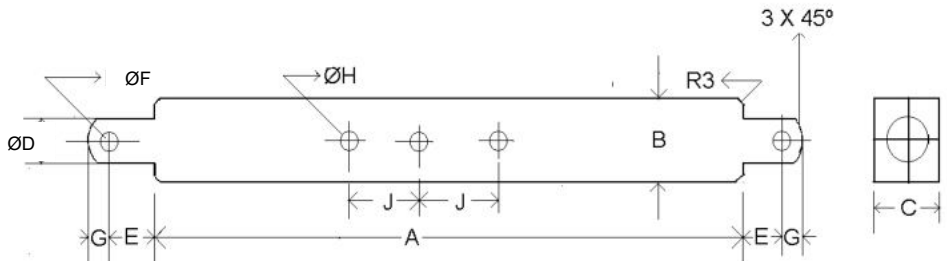


Fig. 1: DIMENSIONAL NOTATIONS FOR LINKAGE DRAWBAR

3.1.13.3.2 Swinging drawbar : Not provided

3.1.13.3.3 Provision to attach trailer brake valve assembly : 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 & separate lever for varying the speed provided behind the operator seat above differential housing.
No. of shaft,(s)	:	One
PTO speed corresponding to rated engine speed, (rpm)	:	569
Other speed corresponding to rated engine speed (rpm)	:	771 Economy
Distance behind rear axle, (mm)	:	455
Engine to PTO speed ratio	:	3.692:1 for 540 2.722:1 for 540E
Whether the PTO shaft is capable of transmitting the full power of engine	:	Yes

3.1.14.1 Specifications of Power Take-Off Shaft: [See Fig. 2]

Specification	As per IS:4931-1995 (Type-I) (reaffirmed in 2014)	As observed	Remarks
Nominal speed, (rpm)	540 ± 10	540 rpm of PTO shaft corresponds to 1994 rpm of engine respectively.	Conforms
No. of splines	6	6	Conforms
Direction of rotation	Clockwise	Clockwise	Conforms
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.	In centre	Conforms
Dimensions, (mm) (See Fig. 2):			
D∅	34.79 ± 0. 06	34.8	Conforms
d∅	28.91 ± 0.05	28.9	Conforms
B∅	29.4 ± 0.1	29.4	Conforms
A∅ (optional)	8.30 ± 0.10	8.2	Conforms
W	8.69 – 0.09 -0.16	8.60	Conforms
a	7	7	Conforms
b(optional)	25 ± 0.5	25.3	Conforms
c	38	38	Conforms
X	30°	30°	Conforms
B	76 (min)	90	Conforms
h	450 to 675	630	Conforms

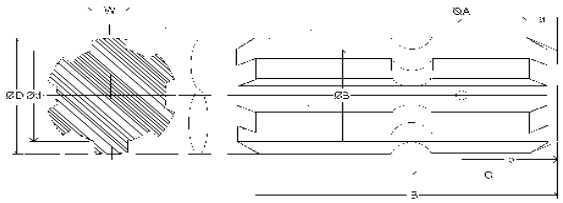


Fig. 2: DIMENSIONAL NOTATIONS FOR TYPE-I POWER TAKE-OFF SHAFT

3.1.14.2 Power Take-off Master Shield : Not provided

3.1.15 Towing hitch:

3.1.15.1 Front:

Type	:	Clevis
Location	:	At front on front engine support bracket
Height above ground level,(mm)	:	735 (fixed)
Type of adjustment	:	None
Width of clevis, (mm)	:	60.0
Dia of pin hole, (mm)	:	32.6

3.1.15.2 Rear:

Type	:	Clevis
Location	:	At rear of transmission housing
Height above ground level, (mm):		
- Maximum	:	695
- Minimum	:	475

	No. of position	:	08
	- Type of adjustment	:	By changing the position of hitch on its mounting bracket
	Distance of hitch point,(mm):		
	- From rear axle centre	:	585
	- From power take-off shaft end	:	130
	Dia of pin hole, (mm)	:	32.4
	Width of clevis, (mm)	:	85.2
3.1.16	**Steering:**		
	Make	:	Danfoss
	Type	:	Hydrostatic, power steering
	Location	:	Above clutch housing
	Method of operation	:	Manual, by steering control wheel
	Diameter of steering control wheel, (mm)	:	420
	Make & type of pump	:	Dynamatics & Tandem gear pump
	Location & Method of drive	:	On RHS of the engine, driven through timing gears.
	Make , type & number of hydraulic cylinder	:	Ognibene, double acting & one
	Location of ram cylinder	:	At centre, behind front axle
	Steering oil capacity, (l)	:	40.4 (Common with transmission, hydraulic and brake system)
	Lubricant change period	:	After every 1200 hours of operation.
3.1.17	**Brakes:**		
3.1.17.1	**Service Brake:**		
	Make	:	JMI
	Type	:	Mechanical, oil immersed multi discs
	Location	:	On rear axle shaft, outside the differential housing
	No. of disc(s)	:	Three (on each wheel side)
	Area of liners, (cm^2)	:	1245.5 (on each wheel side)
	Material of liners	:	Non Asbestos (apa)
	Method of operation	:	Individual / combined, pedal operation by right foot.
	Oil capacity, (l)	:	40.4 (common with transmission, hydraulic and steering system)
	Oil change period	:	After every 1200 hours of operation.
3.1.17.2	**Parking Brake:**		
	Type	:	Ratchet & tooth type locking mechanism
	Location & method of operation	:	A hand lever is provided below the dashboard, which is to be pulled to lock the service brake act as parking brake.
3.1.18	**Wheel Equipment:**		
3.1.18.1	**Steered Wheel(s):**		
	Make	:	MRF
	Number	:	Two
	Type of tyre	:	Pneumatic, ribbed
	Size	:	7.50-16
	Ply rating	:	08

	Maximum permissible loading capacity of each tyre at inflation pressure recommended for road work, kgf	:	600 (as per ITTAC manual)
	Recommended inflation pressure, kPa :		
	- for field work	:	167
	- for transport	:	196
	Track width, (mm)	:	1400 (std.), 1460, 1470, 1480, 1560 & 1570
	Method of changing track width	:	By extending the telescopic front axle & reversing the wheel disc.
	Make & size of rim	:	WIL.& 5.50F x 16
3.1.18.2	**Driving wheel:**		
	Make	:	MRF Shakti life
	Number	:	Two
	Type of tyre	:	Pneumatic, traction
	Size	:	14.9-28
	Ply rating	:	12
	Maximum permissible loading capacity of each tyre, kgf	:	1600 at 230 kPa
	Recommended inflation pressure, (kPa)		
	- for field work	:	118
	- for transport	:	137
	Track width, (mm)	:	1340, 1420, 1460, 1540 (Std.), 1620, 1700, 1720 & 1820
	Method of changing track width	:	By reversing and changing the position of wheel disc on offset rim lugs
	Make & size of rim	:	WILP & W13 X 28
3.1.18.3	**Wheel base, (mm)**	:	2155
	Method of changing wheel base, if any	:	**None**
3.1.19	**Operator's seat:**		
	Make	:	Polar Auto & Engg.
	Type	:	Cushioned seat with backrest
	Type of suspension	:	Two, Helical coil springs
	Type of damping	:	One, Hydraulic shock absorber
	Range of adjustment,(mm):		
	- Vertical	:	Nil
	- Lateral	:	Nil
	- Longitudinal	:	± 70

3.1.20 Provision for safety and comfort of operator:

3.1.20.1 Conformity with IS: 12343-1998 (Reaffirmed in 2014):

All parameters meets the minimum requirements of IS: 12343-1998, (Reaffirmed in 2014), **except the following:**

i) Longitudinal distance from Seat Index Point to centre of differential lock pedal.

3.1.20.2 Conformity with IS: 6283 (Part-1) – 2006 (Reaffirmed in 2014) & IS: 6283 (Part-2) – 2007 (Reaffirmed 2014):

All the controls are identifiable with symbols as per IS: 6283 (Part-1) – 2006 (Reaffirmed in 2014) & IS: 6283 (Part-2) – 2007 (Reaffirmed 2014).

3.1.20.3 Conformity with IS: 8133-1983 (Reaffirmed in 2014) :
Location and movement of various controls meets the requirement of IS: 8133-1983 **(Re-affirmed in 2014)**, except the provision of compression ignition lever does not remain in stop position.

3.1.20.4 Conformity with IS: 12239 (Part-1)-1996 (Reaffirmed in October, 2017):
Meets the requirements of IS: 12239 (Part-1)-1996 (Reaffirmed in October, 2017), **except the following:**

i) The spark arrester is not been provided in the exhaust system.
ii) Vertical retainness is not provided on both sides of clutch pedal.

3.1.20.5 Conformity with IS:12239 (Part-2)-1999 (Reaffirmed in 2014) :
Meets the requirements of IS: 12239 (Part-2)-1999 (Reaffirmed in 2014); **except the following:**

i) PTO master shield has not been provided.
ii) The working clearance between position and draft control lever of hydraulic system is less than the minimum requirement.

3.1.20.6 Conformity with IS: 14683 – 1999 (Reaffirmed in 2014) :
Lighting requirements conform to IS: 14683-1999 (Reaffirmed in 2014).

3.1.20.7 Rear view mirror:
Rear view mirror is provided

3.1.20.8 Slow moving emblem : Provided

3.1.21 Labelling of tractor as per IS: 10273-1987 (Reaffirmed in 2014):
Location of labeling : It is riveted on LHS of inner side of mudguard and provides the following information:-

Name of Manufacturer	**:**	**Mahindra & Mahindra Ltd. Farm Equipment Sector , India**
Make	:	Mahindra
Model	:	605 DI MS
Month & Year of manufacture	:	10 / 20
Engine Serial Number	:	NLG4WNE0014
Chassis Serial Number	:	MBNWHBDKELNG00003
Maximum PTO Power, kW	:	33.5
Specific fuel consumption, g/kWh	:	258

3.1.22 Mass of the tractor, (kg):

Particulars		Mass of the tractor without operator but with all the liquid reservoirs full, (kg)		
		Front	Rear	Total
i)	Without ballast	935	1450	2385

3.1.22.1 Standard ballast, if any : **None**

3.1.23 Overall dimensions:

Condition	Length, (mm)	Width, (mm)	Height, (mm)		Ground Clearance, (mm)
			With exhaust pipe	Without exhaust pipe	
With Unballasted	3660	1945	2145	1750 (At steering control wheel)	390 (Below rear hitch bracket)

3.1.24 Number of external lubricating points:

- Oiling : Nil
- Grease nipples : 19
- Grease cups : 02

3.1.25 Colour of tractor:

Chassis & engine : Grey

Sheet metal:

Bonnet & Mudguard : Red

Rim & Disc : Silver

3.1.26 Details of Optional features:

3.1.26.1 Steered Wheel(s):

Make : CEAT, Ayushmaan

Number (s) : Two

Type of tyre : Pneumatic, ribbed

Size : 6.00-16

Ply rating : 08

Drive wheel(s):

Make : Apollo

Number (s) : Two

Type of tyre : Pneumatic, traction

Size : 16.9-28

Ply rating : 12

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 **14.9-28** size tyres of **640 mm** rolling index (kmph)		Nominal speed at rated engine speed when fitted with 16.9-28 size tyres of 670 mm radius index, (kmph)	Variation in nominal speed between Previous & Present sample (%)
		Previous sample	**Present sample**	**Previous sample**	**Present sample**	**With Optional Fitment**	
Forward	L1	310.40	310.94	1.63	1.63	1.70	0.0
	L2	214.61	214.46	2.36	2.36	2.47	0.0
	L3	149.05	149.11	3.40	3.40	3.55	0.0
	L4	118.59	118.43	4.27	4.27	4.47	0.0
	L5	88.04	87.99	5.75	5.76	6.03	0.2
	M1	105.21	105.33	4.82	4.81	5.04	-0.2
	M2	72.65	72.58	6.97	6.98	7.30	0.1
	M3	50.47	50.03	10.04	10.05	10.51	0.1
	M4	40.05	40.10	12.65	12.65	13.23	0.0
	M5	29.79	29.64	17.01	17.02	17.81	0.1
	H1	55.76	55.79	9.09	9.09	9.51	0.0
	H2	38.52	38.51	13.15	13.16	13.77	0.1
	H3	26.75	26.76	18.94	18.94	19.81	0.0
	H4	21.23	21.28	23.87	23.82	24.93	-0.2
	H5	15.82	15.70	32.03	32.04	33.52	0.0
Reverse	LR	163.96	163.74	3.09	3.09	3.23	0.0
	MR	55.42	55.42	9.14	9.13	9.56	-0.1
	HR	29.41	29.42	17.23	17.23	18.03	0.0

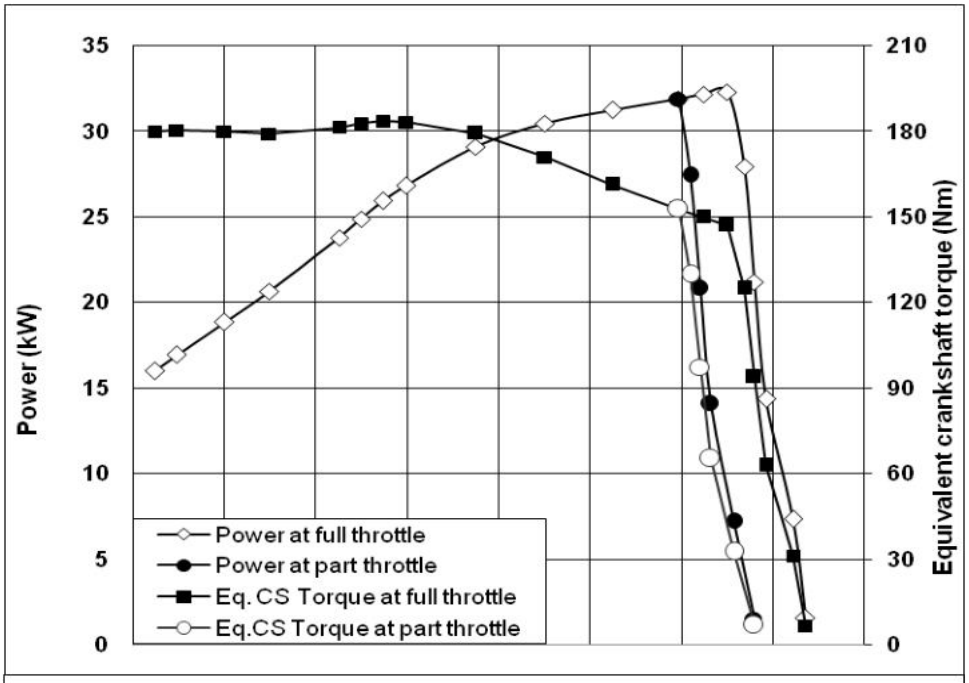
3.3 PTO PERFORMANCE TEST

Date(s) of test : 31.12.2020 & 01.01.2021
Tractor run at the Institute prior to start of PTO test (h) : 1.7
Type of dynamometer bench used : SAJ-AG 720 Eddy Current.

3.3.1 The results of power take-off performance are tabulated in Table-**1** and graphically represented in **Fig. 3, 4 and 5.**

Power, (kW)	Speed (rpm)		Fuel consumption			Specific energy (kWh/l)
	PTO	Engine	(l/h)	(kg/h)	Specific, (kg/ kWh)	
1	**2**	**3**	**4**	**5**	**6**	**7**
a) Maximum power – 2 hours test:						
32.3	569	2101	10.62	8.88	0.275	3.04
30.3	569	2101	9.98	8.35	0.276	3.04*
b) Power at rated engine speed (2100 rpm):						
32.3	569	2101	10.62	8.88	0.275	3.04
30.3	569	2101	9.98	8.35	0.276	3.04*
c) Power at standard power take-off speed (540 ± 10 rpm):						
31.9	540	1994	10.19	8.52	0.267	3.13
30.0	540	1994	9.68	8.09	0.270	3.10*
d) Varying loads at rated engine speed:						
i) Torque corresponding to maximum power available at rated engine speed (2100 rpm):						
32.3	569	2101	10.62	8.88	0.275	3.04
ii) 85% of the torque obtained in (i):						
27.9	579	2138	9.09	7.60	0.272	3.07
iii) 75% of the torque obtained in (ii) :						
21.2	585	2160	7.42	6.20	0.292	2.86
iv) 50% of the torque obtained in (ii) :						
14.3	592	2186	5.74	4.80	0.336	2.49
v) 25% of the torque obtained in (ii) :						
7.3	608	2245	4.31	3.60	0.493	1.69
vi) Unloaded:						
--	617	2278	3.07	2.56	--	--
e) Varying loads at Standard PTO Speed:						
i) Torque corresponding to maximum power available at standard PTO speed: (540 ± 10 rpm):						
31.9	540	1994	10.19	8.52	0.267	3.13
ii) 85% of the torque obtained in (i) :						
27.4	547	2020	8.81	7.36	0.269	3.11
iii) 75% of the torque obtained in (ii) :						
20.8	553	2042	7.05	5.89	0.283	2.95
iv) 50% of the torque obtained in (ii):						
14.1	559	2064	5.49	4.59	0.326	2.57
v) 25% of the torque obtained in (ii) :						
7.2	573	2116	4.06	3.39	0.471	1.77
vi) Unloaded:						
--	588	2170	2.73	2.28	--	--

*** Under high ambient conditions**



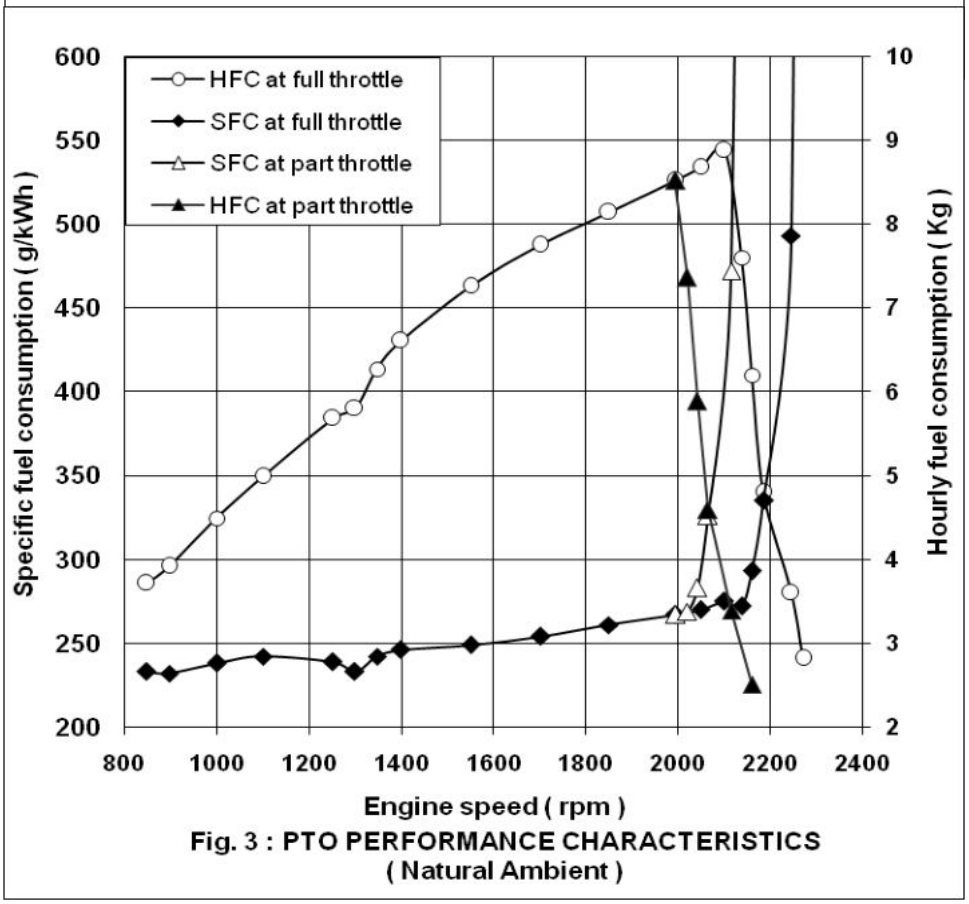


Fig. 3 : PTO PERFORMANCE CHARACTERISTICS
(Natural Ambient)

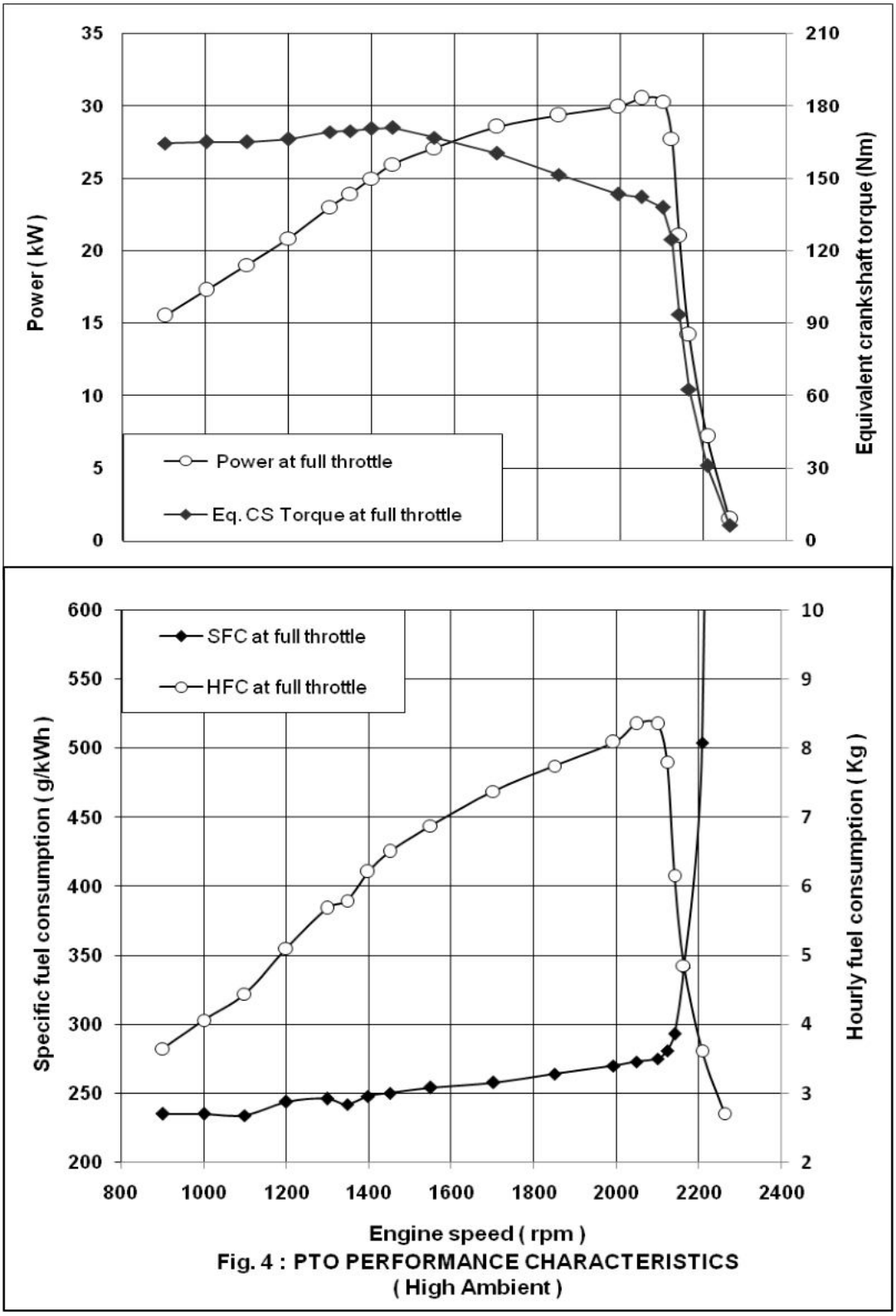


Fig. 4 : PTO PERFORMANCE CHARACTERISTICS
(High Ambient)

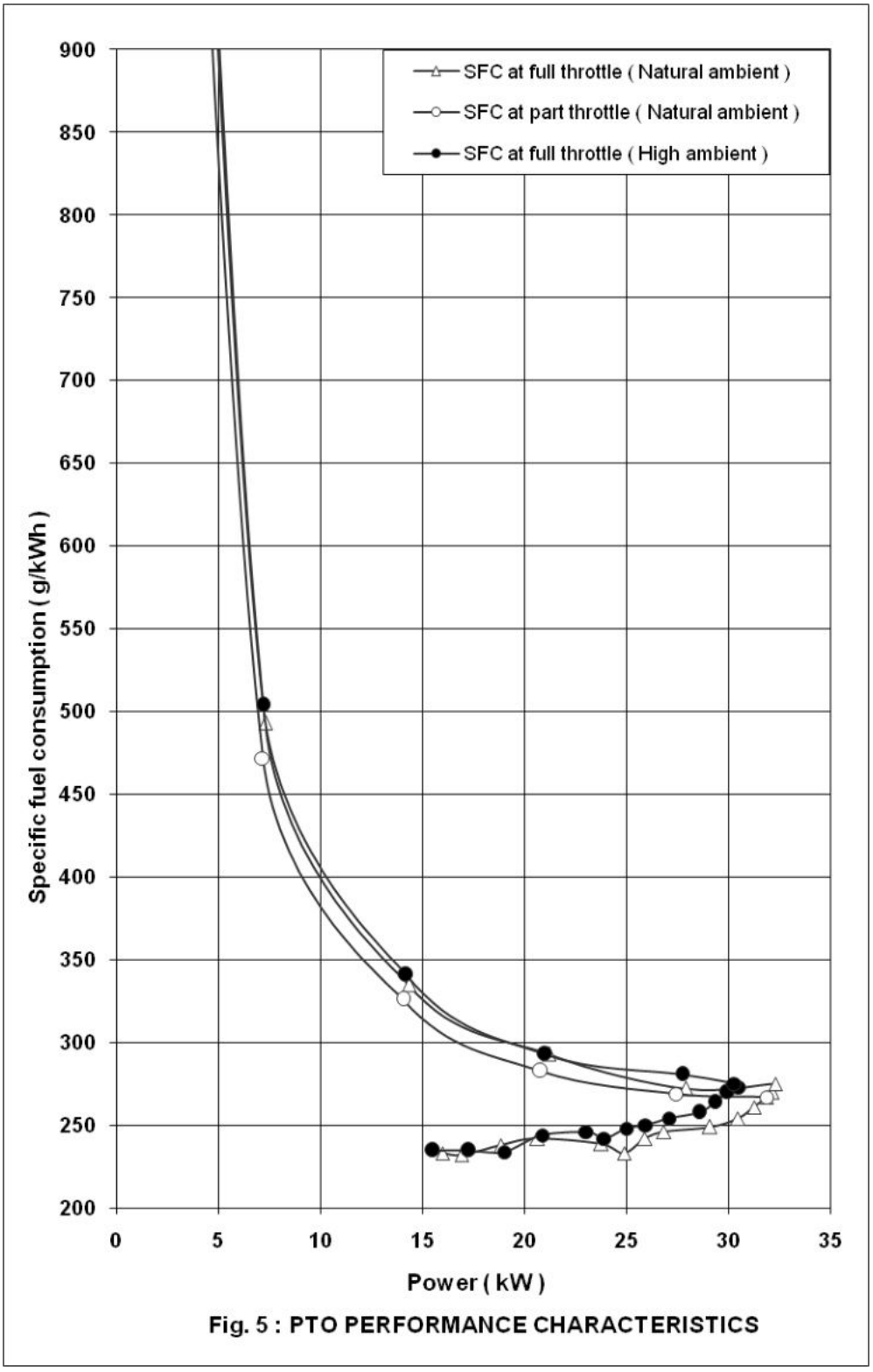


Fig. 5 : PTO PERFORMANCE CHARACTERISTICS

S. No.	Parameters	Natural Ambient	High Ambient
i)	No load maximum speed, (rpm)	2278	2263
ii)	Equivalent crankshaft torque at maximum power, (Nm)	147.0	137.8
iii)	Equivalent crankshaft torque at rated power, (Nm)	147.0	137.8
iv)	Maximum equivalent crank shaft torque, (Nm)	183.6	170.9
v)	Engine speed at maximum equivalent crankshaft torque, (rpm)	1348	1451
vi)	Backup torque, (%)	24.9	24.0
vii)	Smoke level, (m^{-1})	0.19	---
viii)	**Range of atmospheric condition :**		
	- Temperature, (^{O}C)	25 to 27	40 to 45
	- Pressure, (kPa)	99.2 to 99.8	99.2 to 99.5
	- Relative humidity, (%)	24 to 38	14 to 20
ix)	**Maximum Temperature, (^{O}C):**		
	- Engine oil	119	129
	- Coolant	81	97
	- Fuel	55	71
	- Air intake	31	47
	- Exhaust gas	559	570
x)	**Pressure at maximum power:**		
	- Intake air, (kPa)	2.0 to 2.1	2.1 to 2.2
	- Exhaust gas, (kPa)	9.9 to 10.1	9.0 to 9.2
xi)	**Consumptions:**		
	Lub. Oil, (g/kWh)	--	0.59
	-Coolant (% of total coolant capacity)	--	0.56

4. ADJUSTMENTS, DEFECTS, BREAKDOWNS AND REPAIRS

Sl. No.	Adjustments/Defects/Breakdowns and Repairs	Tractor run hours
--None--		

5. COMPARISON OF SPECIFICATION AND PERFORMANCE CHARACTERISTICS OF PREVIOUS SAMPLE [TEST REPORT NO. T-1067/1592/2017 (January, 2017)] AND PRESENT SAMPLE

5.1	Specification:		Previous sample	Present sample
5.1.1	**Tractor**:			
	Make	:	Mahindra	Mahindra
	Model	:	605 DI MS	605 DI MS
5.1.2	**Engine:**			
	Make	:	Mahindra	Mahindra
	Model	:	MSI 450 3A	MSI 450 3A
	Bore/Stroke, (mm)	:	96 / 122	96 / 122
	Specified cubic capacity, (cu.cm)	:	3532	3532
	Rated engine speed (rpm)	:	2100	2100

			Previous sample	Present sample
5.1.2.1	**Fuel system:**			
	Make & model of fuel feed pump	:	Bosch, India & FP/KS22AD62, 9440 030 029	Bosch, India & FP/KSG22AD105, F002A50040
	Make & model of fuel filters	:	Bosch, India & F002 H20 117	Bosch, India & F002 H20 117
	Make and model of fuel injection pump	:	F002A2Z016 & PES4A95D320RS2000	F002A2Z016 & PES4A95D320RS2000
	Make of fuel injectors	:	Bosch, India	Bosch, India
	Model of fuel injectors:			
	- Nozzle No.	:	0432193410	0432193410
	- Nozzle holder No.	:	DSLA147P1379	DSLA147P1379
	Type of injector	:	Multi holes (Six holes)	Multi holes (Six holes)
	Manufacturer's production pressure setting, (MPa)	:	25.0 + 0.08	25.0 + 0.8
	Injection timing	:	3.5 ± 1 degree before TDC	3.5 ± 1 degree before TDC
	Make & model of governor	:	Bosch, India & RSV400…1050A2C1790R	Bosch, India & RSV400…1050A2C1790R
5.1.2.2	**Cooling system:**			
	Total coolant capacity, (l)	:	9.8	9.0
5.1.2.3	**Lubricating system:**			
	Total lubricating oil capacity,(l)	:	10.5	9.8
5.1.3	**Transmission:**			
5.1.3.1	**Clutch:**			
	Type	:	Dual, Dry friction plate and pads type	Dual, Dry friction plate and pads type
	Size, OD/ID, (mm): Transmission	:	310 / 197Φ	310 / 197Φ
	PTO	:	280 / 165 Φ	280 / 165 Φ
5.1.3.2	**Gear Box:**			
	No. of speeds:			
	- Forward	:	15	15
	- Reverse	:	03	03
	Range of speed, (kmph) :			
	- Forward	:	1.63 to 32.03	1.63 to 32.04
	- Reverse	:	3.09 to 17.23	3.09 to 17.23
5.1.4	**Service Brake:**			
	Make	:	JMI	JMI
	Type	:	Mechanical, oil immersed multi discs	Mechanical, oil immersed multi discs
	No. of friction disc	:	Three (on each wheel side)	Three (on each wheel side)
	Area of liners, (cm^2)	:	1232.9 (on each wheel side)	1232.9 (on each wheel side)

			Previous sample	Present sample
5.1.5	**Wheel equipment:**			
	Make & Size of tyres :			
	- Front	:	CEAT, Ayushmaan & 7.50-16	MRF & 7.50-16
	- Rear	:	Good Year & 14.9-28	MRF Shakti life & 14.9-28
	Standard Track width, (mm):			
	- Front	:	1320	1400
	- Rear	:	1540	1540
5.1.5.1	**Wheel base, (mm)**	:	2150	2155
5.1.6	**Overall dimensions, (mm):**			
	- Length	:	3660	3660
	- Width	:	1940	1945
	- Height	:	1745	2145
	- Ground clearance, (mm)	:	400 (below rear hitch bracket)	390 (Below rear hitch bracket)
5.1.7	**Operational mass of Unballasted tractor(kg):**			
	- Front	:	910	935
	- Rear	:	1520	1450
	- Total	:	2430	2385

5.1.8	**Conformity with following IS:**		Previous sample	Present sample
i)	Guide lines for declaration of power and specific fuel consumption and labelling of agricultural tractors (First revision) [IS10273: 1987 (Reaffirmed 2014)]	:	**Did not Confirm**	Confirms
ii)	Agricultural tractors - Rear mounted power take-off - Types 1, 2 and 3 (third revision) [IS:4931-1995 (Reaffirmed 2014)]	:	Confirmed	Confirms
iii)	Agricultural wheeled tractors - Rear mounted three-point linkage: Part 1 Categories 1, 2, 3 & 4 (fourth revision) [IS 4468 (Part-I):1997 (Reaffirmed in October, 2017)]	:	**Did not Confirm**	Confirms
iv)	Drawbar for agricultural tractors – Link type [IS 12953:1990 (Reaffirmed October, 2017)]	:	Confirmed	Confirms
v)	Agricultural tractors - Operator's seat technical requirement [IS 12343 –1998 (First revision) (Reaffirmed 2014)]	:	**Did not Confirm**	**Doesn't Confirm**
vi)	Guide for safety & comfort of operator of agricultural tractors: Part 1 General requirements (first revision): [IS 12239 (PT-1) 1996/ISO 4254-1:1989 (Reaffirmed October, 2017)]	:	**Did not Confirm**	**Doesn't Confirm**
vii)	Tractors and machinery for agriculture and forestry – Technical means for ensuring safety Part 2: Tractors (first revision) (IS 12239 (PT-2) 1999) (Reaffirmed 2014)]	:	**Did not Confirm**	**Doesn't Confirm**
viii)	Guide lines for location and operation of operator controls on agricultural tractors and machinery (first revision) IS: 8133-1983 (Reaffirmed 2014)]	:	**Did not Confirm**	**Doesn't Confirm**

			Previous sample	Present sample
ix)	Tractors and machinery for agriculture and forestry, powered lawn and garden equipment - Symbols for operator controls and other displays Part 2 Symbols for agricultural tractors and machinery [IS:6283 (Part-1)- 2006 and IS: 6283 (Part-2)-2007 (Reaffirmed 2014)]	:	Confirmed	Confirms
x)	Agricultural Tractors and Machinery - Lighting device for travel on public roads (IS: 14683-1999) (Reaffirmed 2014)]	:	Confirmed	Confirms

5.2 Performance Characteristics:

5.2.1 PTO Performance:

Maximum Power, (kW)	:	32.8	32.3
Power at Rated engine speed,(kW)	:	32.8	32.3
Specific fuel consumption corresponding to maximum power, (g/kWh)	:	245	275
Maximum equivalent crank shaft torque, (Nm)	:	168.4	183.6
Backup torque, (%)	:	13.1	24.9

Maximum temperatures (degree):

Engine oil	:	121	129
Coolant	:	86	97
Air intake	:	44	47
Exhaust gas	:	477	570

5.3 Salient Observations:

5.3.1 Adequacy of literature:

The following combined literature tractor models were supplied with the test sample for reference during the test.

a) Service Manual	**a)** Service Manual
b) Parts Catalogue	**b)** Parts Catalogue
c) Operator's manual	**c)** Operator's manual

6. SUMMARY OF OBSERVATIONS, COMMENTS & RECOMMENDATIONS

6.1 On the basis of test conducted the performance results have been summarized as evaluative (mandatory) / Non-evaluation (Non-mandatory) parameter applicable for qualifying Minimum Performance criteria as per Clause-4 (Table-1) of **Indian standard: 12207-2019** for acceptance of the tractor for the purpose of subsidies/NABARD financing are summarized as under:

S. No.	Characteristic	Category (Evaluative / Non Evaluative)	Requirements as per IS: 12207-2019	Values declared by the applicant (D) / Requirement (R)	As obser-ved	Whether meets the require-ments (Yes / No)
1	2	3	4	5	6	7
6.1.1	**PTO Performance :**					
a)	Max. power under 2 h test, (kW) (Natural ambient condition)	Evaluative	Declared value to be achieved with a tolerance of: ± 5% for PTO power or engine power >26 kW, ± 10% for PTO power or Engine power ≤ 26 kW.	33.5 (D)	32.3	Yes
b)	Power at rated engine speed, (kW)	Non Evaluative	-do-	33.5 (D)	32.3	Yes
c)	Specific fuel consumption corresponding to maximum power, (g/kWh)	Evaluative	+ 10% Max.	258 (D)	275	Yes
d)	Maximum equivalent crankshaft torque, (Nm)	Non Evaluative	± 8%	178 (D)	183.6	Yes
e)	Back-up torque, percent	Evaluative	12 % (Minimum)	15 (D) 12 (R)	24.9	Yes
f)	Maximum operating temperature(^{O}C)					
	1) Engine oil	Evaluative	The declared value should not exceed the max. value specified by the oil company and the observed value under high ambient condition should not exceed the declaration.	130 (D)	129	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)	97	Yes
g)	Engine oil consumption, (g/kWh)	Evaluative	Not exceeding 1% of SFC at max. power under High ambient conditions	2.75 (R) Maximum	0.59	Yes
h)	Smoke level, (m^{-1})	Evaluative	Maximum light absorption coefficient of 3.25 per meter or equivalent BOSCH No. 5.2 or 75 Hat ridge value (**As per CMVR**)	3.25 (R)	0.19	Yes

1	2	3	4	5	6	7
6.1.2	**Safety features :**					
a)	Guards against moving and hot parts	Evaluative	Belt drives, pullies, silencer, hydraulics pipes(as per IS-12239 Part 2)	Meet the requirements		Yes
b)	Lighting arrangement	Evaluative	As per CMVR	Meet the requirements		Yes
c)	Seating requirements (Tractors having more than 1150 mm rear track width)	Non Evaluative	Should meet the requirements of IS: 12343 (As amended from time to time)	**Does not meet the requirements**		**No**
d)	Technical requirements for PTO shaft	Evaluative	Should meet the requirements of IS: 4931 (As amended from time to time)	Meet the requirements		Yes
e)	Dimensions of three point linkage	Non Evaluative	Should meet the requirements of IS: 4468 (Part-I) (As amended from time to time)	Meet the requirements		Yes
f)	Specifications of linkage drawbar	Evaluative	Should meet the requirements of IS 12953 (As amended from time to time)	Meet the requirements		Yes
g)	Specifications of Swinging drawbar (wherever fitted)	Evaluative	Should meet the requirements of IS 12362 (Part 3) (As amended from time to time)	**Not provided**		**Not applicable**
h)	1) Maximum travelling speed at rated engine speed in reverse gears, kmph	Evaluative	Should not exceed 20 kmph	17.23 kmph (Meets the requirement)		Yes
	2) Audible warning signal on tractor.	Evaluative	As soon as the travelling speed in reverse gear reaches to 20 kmph, an audible warning signal on tractor shall be activated.	**Not fitted**		**Not applicable**
6.1.3	**Labelling of tractors (Provision of labelling plate):**					
	1) Make	Evaluative	Should conform to the requirements of CMVR along with maximum declared value of PTO power in kW and for month & year of manufacture in numerical MM | YY Digit 01-12 in box No.1 for MM will represent the month and next two digit in the box No.2 for YY will represent the year of manufacturing	Mahindra		Yes
	2) Model	Evaluative		605 DI MS		Yes
	3) Month & Year of manufacture	Evaluative		10 / 20		Yes
	4) Engine number	Evaluative		NLG4WNE0014		Yes
	5) Chassis number	Evaluative		MBNWHBDK ELNG00003		Yes
	6) Declaration of PTO power, kW	Evaluative		33.5		Yes
	7) Specific fuel consumption (g/kWh)	Evaluative		258		Yes

1	2	3	4	5	6	7
6.1.4	**Literature (Submission to test agency)**					
(a)	Operator manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes
(b)	Parts Catalogue	Evaluative	Provided / Not Provided	Provided	Provided	Yes
(c)	Workshop/ Service manual	Evaluative	Provided / Not Provided	Provided	Provided	Yes
6.1.5	**Fitment of Roll Over Protective Structure (ROPS):** for tractors having more than 1150 mm rear track width	Evaluative	ROPS should meet the requirement of IS:11821 or OECD code or equivalent International Standard	Provided	**Not Fitted**	**Not Applicable**
6.1.6	**Standard accessories**	Evaluative	Trailer hitch, front tow hook, linkage drawbar should be provided with tractor	Provided	Provided	Yes
6.1.7	**Accessories (Optional)**	Non Evaluative	Ballast weights if fitted should meet the requirement of CMVR.	Provided	Provided	Yes
6.2	**CATEGORY OF BREAKDOWNS / DEFECTS (As per clause 5.0 of IS:12207-2019):**					
S. No.	**Category of Breakdown**	**Category (Evaluative / Non Evaluative)**	**Requirements as per IS: 12207-2019**		**As observed**	**Whether meets the requirement (Yes/No.)**
1.	Critical breakdown	Evaluative	There is no 'critical breakdown' during the course of testing		None	Yes
2.	Major breakdowns	Evaluative	There are not more than 01major breakdowns and neither of them is of repetitive nature		None	Yes
3.	Minor breakdowns	Evaluative	There are not more than 03 minor defects during the test and the frequency of each is not be more than two		None	Yes
4.	Total breakdowns	Evaluative	In no case, the total number of breakdowns should exceed four that is, (01 major + 03 minor) or 04 minor breakdowns		None	Yes

6.3 Salient Observations:

6.3.1 Laboratory tests:

6.3.1.1 PTO Performance:

i) The maximum PTO power was recorded as **32.3 kW** against the declaration of **33.5 kW,** which meets the evaluative requirement of IS: 12207-2019.

ii) The specific fuel consumption corresponding to maximum power was recorded as **275 g/kWh** against the declaration of **258 g/kWh**, which meets the evaluative requirement of IS: 12207-2019.

iii) The maximum equivalent crankshaft torque was recorded as **183.6 N-m** against the declaration of **178.0 N-m**, which is within the permissible limit as specified in IS: 12207-2019.

iv) The backup torque is **24.9 %** and meets the evaluative requirement of IS: 12207-2019.

v) The maximum PTO power drop of **6.2 %** was observed during natural to high ambient conditions. This should be looked into for necessary corrective action.

6.3.1.2 Operator's seat:

The Longitudinal distance from centre of differential lock pedal to Seat Index Point does not meet the requirement of the IS: 12343 -1998 (Re-affirmed in 2014). This should be looked into for necessary corrective action.

6.3.1.3 Three point linkage:

Some of the parameters conform to Cat I and some of them conform to Cat. II. Keeping in view the spirit of standardization, necessary improvements may be incorporated.

6.3.1.4 Operator's work place:

Operator's work place meets the requirements of IS:12239(Part-1)1996 (Reaffirmed Oct., 2017), **except the following**:

i) Provision of vertical retainness at both sides of clutch pedal.

ii) Provision of spark arresting device in the exhaust system.

6.3.1.5 Constructional requirement with regard to safety:

Constructional requirement with regard to safety meets the requirements of IS: 12239 (Part-2)-1999 (Reaffirmed in 2014), **except the following**:

i) The working clearance around the position control & draft control lever is less than the minimum requirement.

6.3.1.6 PTO master shield:

PTO master shield not provided on tractor as per the requirements of IS: 4931-1995(Reaffirmed in 2004). This should be looked into for necessary corrective action.

6.3.1.7 Location of operator's controls with regard to safety:

Location of operator's controls with regard to safety meets the requirements of IS: 8133-1983 (Reaffirmed 2014), **except the following**:

i) The fuel shut-off knob does not remain in stop position without the application of sustain manual effort.

6.4 Maintenance / Service Problems:

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

6.5 Recommendation with regard to safety on tractor:

The following requirements, inter alia, may be considered for incorporation on the tractor:

i) Longitudinal distance from centre of differential lock pedal to Seat Index Point does not meet the requirement. It should be provided as per IS: 12343-1998, (Re-affirmed in 2014).

ii) Provision of spark arrester in the exhaust system.

iii) Master shield around the PTO shaft has not been provided. It should be provided as per IS: 4931-1995 (Re-affirmed in 2014).

iv) The working clearance between position and draft control lever of hydraulic system is less than the minimum requirement. It should be provided as per IS: 12239 (Part-2)-1999 (Reaffirmed in 2014).

v) Vertical retainers at both sides of clutch pedal should be provided as per relevant standard.

vi) The fuel shut off knob does not remain in 'STOP' position. It should automatically remain in stop position without the application of sustains manual effort.

6.6 Adequacy of Literature:

6.6.1 Following literature of following tractor models were supplied with the test sample for reference during the test.

a) Service Manual Part-I, II & III for Mahindra 605 DI PS, 605DI i, 605 DI MS, 605 DI i 4WD S+, 605 DI MS 4WD S+ & 605 DI i Cab tractor models.

b) Parts Catalogue for Mahindra 605 DI PS, 605DI i, 605 DI MS, 605 DI i 4WD S+, 605 DI MS 4WD S+ & 605 DI i Cab tractor models.

c) Operator's manual Mahindra 605 DI PS, 605DI i, 605 DI MS, 605 DI i 4WD S+, 605 DI MS 4WD S+ & 605 DI i Cab tractor models.

6.6.2 The literature should be brought out in national as well as other regional languages of India for guidance of users.

The results of the tests carried out on variant model **"Mahindra 605 DI MS"** tractor have been compared with those on base model **"Mahindra 605 DI PS"** tractor tested vide test report No. **T-1447/1974/2020 (June, 2020)** and found within the limit, as specified in IS: 12207-2019.

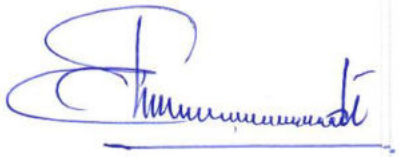
7. CITIZEN CHARTER

Time frame for Testing & Evaluation as per Citizen Charter	Duration of Test	Whether the Test Report is released within the time frame given in Citizen Charter	Remarks
10 Months	04 Months (November, 2020 to February, 2021)	Yes	None

TESTING AUTHORITY:

TESTING AUTHORITY:

SHWETABH SINGH
AGRICULTURAL ENGINEER



C.V. CHIMOTE
TEST ENGINEER

P.K. PANDEY
DIRECTOR

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

8. APPLICANT COMMENT'S

Para No.	Our Reference	Applicant's comments
8.1	6.3.1.1(v), 6.3.1.2, 6.3.1.3, 6.3.1.4(i,ii), 6.3.1.5(i), 6.3.1.6, 6.3.1.7(i) & 6.5	Observation will be studied, and necessary action will be initiated.
8.2	6.6.2	Literatures are available in all regional language of india.

ANNEXURE – I

TRACTOR RUN HOURS DURING TEST

A.	LABORATORY AND TRACK TESTS	HOURS
1.	Running-in	--
2.	PTO performance test	11.4
3.	Nominal speed test	0.8
C.	Miscellaneous test and other run hours including idle run, transportation, trials and preparation for test	0.9
TOTAL:		**13.1**