STÁTNÍ ZKUŠEBNA ZEMĚDĚLSKÝCH, POTRAVINÁŘSKÝCH A LESNICKÝCH STROJŮ

SZZPLS
Třanovského 622/11
CZ-163 04 Praha 6 – Řepy
Czech Republic
Tel.: +420 235 018 111
Fax: +420 235 315 226
E-mail: szzpls@szzpls.cz

Report on test in accordance with the O.E.C.D. STANDARD CODE 2 for the Official Testing of Agricultural and Forestry Tractors

Restricted Code

O.E.C.D. approval № 2/2 034

Date of approval: 14th January 2003



Agricultural Tractor

ZETOR 117 41 Forterra (4WD) 40 km/h version

Manufactured by: ZETOR a.s., CZ-632 00 Brno, Czech Republic

Report № 23033

Date of test: October 2002

TABLE OF CONTENTS

1. SPECIFICATIONS OF TRACTOR 3
2. TEST CONDITIONS 16
3. COMPULSORY TESTS RESULTS 19
3.1 Main power take-off 19
3.2 Hydraulic power and lifting force 24
3.3 Drawbar power test (unballasted tractor) 25
4. OPTIONAL TESTS RESULTS 28
4.1 Braking 28
4.2 Measurement of external noise 29
5. REPAIRS 30
6. REMARKS 30

Tractor manufacturer's name and address:	ZETOR a.s., CZ-632 00 Brno, Czech Republic
Location of tractor assembly:	Brno, Czech Republic
Submitted for test by:	The manufacturer
Selected for test by:	The manufacturer with the agreement of the testing station
Place of running-in:	Brno, Czech Republic
Duration of running-in:	67 hours
Location of test:	SZZPLS Praha, Czech Republic

1. SPECIFICATIONS OF TRACTOR

1.1 IDENTIFICATION

Make of the tractor:	ZETOR
Model (trade name):	11741 Forterra
Type:	4WD

1.1.1 Numbers

1st Serial № or prototype:	R1174101001B
Serial №:	R1174101001B

1.1.2 Other specifications

Model denomination(s) for other countries:	None
Transmission type or gears × groups × ranges:	4 × 2 × 3
Speed version:	40 km/h
Manufacturer identification of technical type number:	None

1.2 ENGINE

Make:	SAME DEUTZ-FAHR GROUP
Model:	1000.6WT1
Type:	4-stroke diesel engine, direct injection, water cooled, turbocharged
Serial №:	*6251*

1.2.1 Cylinders

Number/disposition:	6, in-line, vertical
Bore/stroke:	105.0 mm/115.5 mm
Capacity:	6001 cm^3
Compression ratio:	16.0:1
Arrangement of valves:	Overhead
Cylinder liners:	Without liners

1.2.2 Supercharging

Make, model and type:	GARRETT, 70707-4, exhaust driven
Pressure:	84.7 kPa
Intercooler:	None

1.2.3 Fuel system

Fuel feed system:	Lift pump membrane-type
Make, model and type of fuel filter(s):	FIAMM, FNA 225/10, two-stage with paper cartridge
Capacity of fuel tank:	180 dm³
Make, model and type of injection pump:	BOSCH, PFR 1K 90A 555, in-line, immersed pump, one per cylinder
Serial №:	Not given
Manufacturer's production setting of injection pump	
Flow rate (rated engine speed and full load):	25.38±0.85 dm³/h
Timing:	13.0°+0.5° before TDC
Make, model and type of injectors:	BOSCH, DLLA 155 S 1323, 4 hole
Injection pressure:	18.0±1.0 MPa
Fuel cooler:	None

1.2.4 Governor

Make, model and type:	SME, AT-S9-12V, electronic
Governed range of engine speed:	From 675±25 to 2500±30 rev/min
Rated engine speed:	2350 rev/min

1.2.5 Air cleaner

Pre-cleaner	
Make, model and type:	Integral with main cleaner, cyclon type
Location of air intake:	Under bonnet forward of radiator
Main cleaner	
Make, model and type:	MANN FILTER, 44 500 92 941, dry with paper primary and safety elements, integrated cyclon type pre-cleaner
Maintenance indicator:	Warning light on the dashboard

1.2.6 Lubrication system

Type of feed pump:	Gear
Type of filter(s):	Full flow with replaceable paper element
Number of filters:	2
Oil cooler:	Heat exchanger with engine coolant

1.2.7 Cooling system

Type of coolant:	Water and anti-freeze
Type of pump:	Centrifugal, belt driven

Specification of fan or blower:	Axial, belt driven
Number of fan blades:	6
Fan diameter:	520 mm
Coolant capacity:	19.0 dm³
Type of temperature control:	Thermostat
Superpressure system:	40±10 kPa

1.2.8 Starting system

Make, model and type:	MAGNETI MARELLI, 2.9619.340.0, electrical, solenoid engaged
Starter motor power rating:	3.5 kW
Cold starting aid:	Intake air and coolant heating-up
Safety device:	Starting operable only when clutch pedal fully depressed and p.t.o. switch in off position

1.2.9 Electrical system

Voltage:	12 V, negative earth
Generator	
Make, model and type:	ISKRA, AAK 5363, alternator, belt driven
Power:	910 W
Battery of accumulators	
Number:	1
Rating:	180 Ah at 20 hours

1.2.10 Exhaust system

Make, model and type:	ZETOR, 18.000.1114, expansion and absorption muffler
Location:	Horizontal muffler under bonnet with vertical pipe near right front corner of cab

1.3 TRANSMISSION

1.3.1 Clutch (travel and power take-off/travel alone)

Make, model and type:	ZETOR, 10.021.000, dry plate for transmission only
Number of plates:	1
Diameter of plates:	325 mm
Method of operation:	Hydraulically by pedal

1.3.2 Gear box

Make, model and type:	ZETOR, 16.121.000, mechanical

Description: Synchromesh gear box with 4 forward speeds with 3 ranges power shift (L, M and H), 2 reduction gears (Lo and Hi) and reverse group; speed 4 locked out in reverse operation

	Forward	Reverse
Number of gears	4	3
Number of groups	2	2
Number of ranges	3	3
Total of arrangements	24	18

Available options: None

Oil cooler: Heat exchanger with air

1.3.3 Rear axle and final drives

Make, model and type: ZETOR, 16.154.000, crown wheel and bevel pinion differential and outboard planetary final drives

Differential lock

Type: Dog clutch, electro-pneumatically activated

Method of engagement: Rocker switch on the dashboard

Method of disengagement: Service brake pedal

1.3.4 Front axle

Make, model and type: CARRARO, 20.19, crown wheel and bevel pinion differential and planetary final drives

Differential lock

Type: Limited slip

Method of engagement: Self-engaging

Method of disengagement: Self-disengaging

1.3.5 Total ratios and travelling speeds

Gear №	Group	Range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed at rated engine speed of 2350 rev/min km/h (*)
Forward				
1	Lo	L	355.682	2.04
		M	307.251	2.36
		H	265.739	2.73
2		L	230.401	3.15
		M	199.029	3.65
		H	172.139	4.22
3		L	152.101	4.78
		M	131.390	5.53
		H	113.638	6.39
4		L	106.249	6.84
		M	91.782	7.92
		H	79.382	9.15
1	Hi	L	86.029	8.44
		M	74.315	9.78
		H	64.274	11.30
2		L	55.727	13.04
		M	48.139	15.09
		H	41.635	17.45
3		L	36.789	19.75
		M	31.779	22.86
		H	27.486	26.43
4		L	25.698	28.27
		M	22.199	32.72
		H	19.200	37.84
(*) Calculated with a tyre dynamic radius index of 820 mm (ISO 4251-1:1998)				

Lo: Low group, Hi: High group, L: Low range, M: Medium range, H: High range

1.3.5 Total ratios and travelling speeds (continued)

Gear №	Group	Range	Number of engine revolutions for one revolution of the driving wheels	Nominal travelling speed at rated engine speed of 2350 rev/min km/h (*)
Reverse				
1	Lo	L	307.616	2.36
		M	265.731	2.73
		H	229.828	3.16
2		L	199.266	3.65
		M	172.133	4.22
		H	148.877	4.88
3		L	131.547	5.52
		M	113.635	6.39
		H	98.282	7.39
1	Hi	L	74.403	9.76
		M	64.272	11.30
		H	55.589	13.07
2		L	48.196	15.07
		M	41.634	17.45
		H	36.009	20.17
3		L	31.817	22.83
		M	27.485	26.43
		H	23.771	30.56
(*) Calculated with a tyre dynamic radius index of 820 mm (ISO 4251-1:1998)				

Lo: Low group, Hi: High group, L: Low range, M: Medium range, H: High range

Number of revolutions of front wheels for one revolution of rear-wheels: 1.4061

1.4 POWER TAKE-OFF

1.4.1 Main power take-off

Type: Independent

Method of engagement: Electro-hydraulically actuated multi-plate wet clutch operated by rocker switch, independent of main drive clutch

Number of shafts: 1

Method of changing power take-off shaft ends and speeds: Manually by shaft turning

1.4.1.1 Power take-off proportional to engine speed

Location: At rear of tractor

P.T.O. type	Diameter of power take-off shaft end	Number of splines	In conformity with ISO 500:1991
	mm		
540	34.9	6	Yes
750 (*)	34.9	6	No
1000	34.9	21	Yes
(*) On request available instead of p.t.o. type 540, not fitted to tested tractor			

Height above ground: 695 mm

Distance from the median plane of the tractor: 0 mm

Distance behind rear-wheel axis: 480 mm

P.T.O. type	P.T.O. speed	Engine speed	Ratio of rotation speeds (engine speed/p.t.o. speed)	Power restriction/Maximum torque transmissible
	rev/min	rev/min		kW/Nm
540	540	1913	3.5431	53.0/937.2
	663	2350		
750 (*)	750	2171	2.8940	None
	812	2350		
1000	1000	1950	1.9500	None
	1205	2350		
(*) On request available instead of p.t.o. type 540, not fitted to tested tractor				

Direction of rotation (viewed from behind tractor): Clockwise

1.4.1.2 Power take-off proportional to ground speed

Indicate	Group	Travelling distance for one revolution of power take-off shaft	Number of power take-off shaft revolutions for one revolution of (rear) driving wheels
rev/min		m	
540	Lo	0.202	25.4853
	Hi	0.836	6.1641
750 (*)	Lo	0.165	31.2008
	Hi	0.683	7.5465
1000	Lo	0.111	46.3059
	Hi	0.460	11.2000
(*) On request available instead of p.t.o. type 540, not fitted to tested tractor			

Lo: Low group, Hi: High group

Direction of rotation with forward gear engaged (viewed from behind tractor): Clockwise

1.4.2 Optional power take-off (on request available, not fitted to tested tractor)

Type: Independent

Method of engagement: Electro-hydraulically actuated multi-plate wet clutch operated by rocker switch, independent of main drive clutch

Number of shafts: 1

Method of changing power take-off speeds: None

1.4.2.1 Power take-off proportional to engine speed

Location: At front of tractor

P.T.O. type	Diameter of power take-off shaft end	Number of splines	In conformity with ISO 8759-1:1998
	mm		
1000	34.9	21	Yes

Height above ground: 709 mm

Distance from the median plane of the tractor: 0 mm

Distance in front front-wheel axis: 658 mm

P.T.O. type	P.T.O. speed	Engine speed	Ratio of rotation speeds (engine speed/p.t.o. speed)	Power restriction/Maximum torque transmissible
	rev/min	rev/min		kW/Nm
1000 (CW)	1000	1952	1.9524	35.0/334.2
	1204	2350		
1000 (CCW)	1000	1955	1.9545	
	1202	2350		

Direction of rotation (viewed from face tractor): Clockwise or counterclockwise (on request available, not fitted to tested tractor)

1.4.2.2 Power take-off proportional to ground speed None

1.5 HYDRAULIC POWER LIFT

Make, model and type: ZETOR, 10.940.404, hydraulic with electronical position, draft or mixed control, lower link sensing

Type of hydraulic system: Open centre

Type and number of cylinders: 1 integral single-acting and 1 external single-acting

Type of linkage lock for transport: Hydraulic

Relief valve pressure setting (tolerance): $18.8^{+1.3}$ MPa

Opening pressure of cylinder safety valve: $21.0^{+2.0}$ MPa

Lift pump type: Gear pump

Transmission between pump and engine: Gear driven from engine

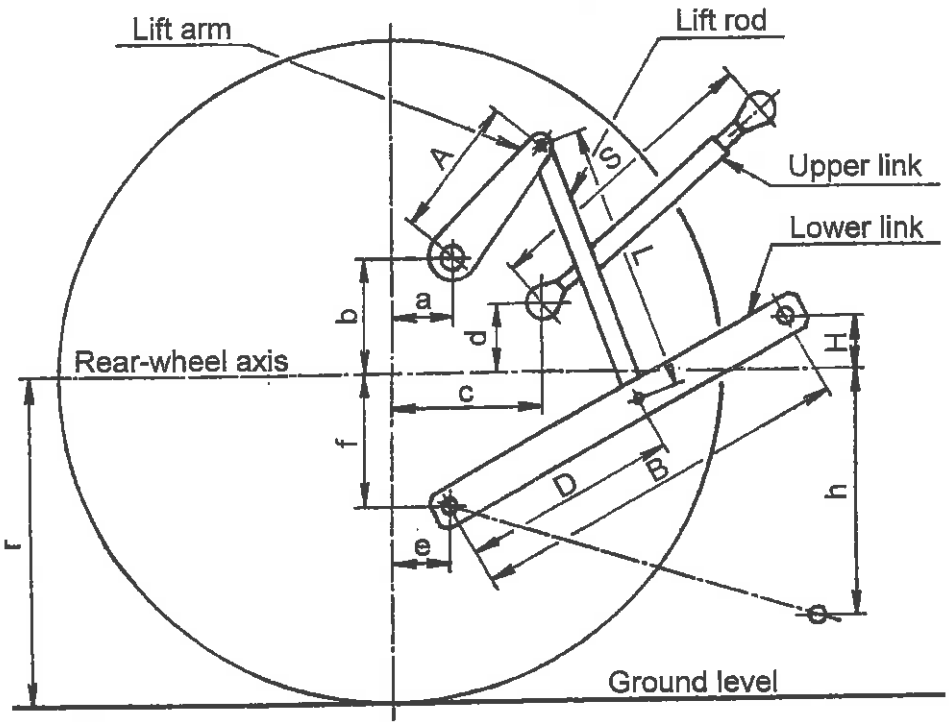
Type and number of filters: 1 magnetic and 1 screen filter in suction side and 1 full flow filter with replaceable paper cartridge in delivery side of pump of gear box

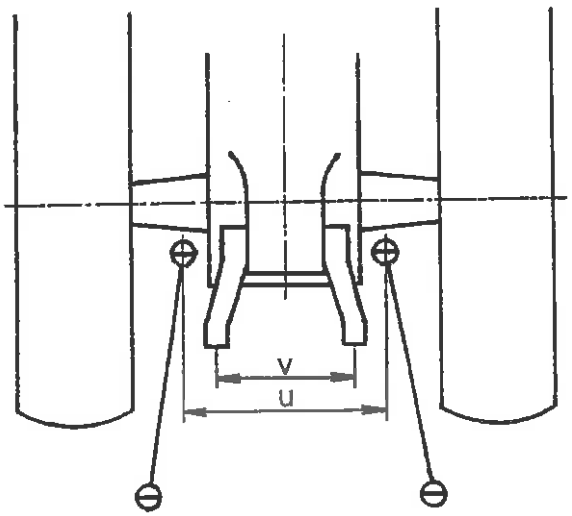
Site of oil reservoir: Transmission housing

Type, number and location of tapping points:	ISO standard couplings 12.5 mm, 3 double acting control valves, 6 pressure and 1 return couplings at rear of tractor
Maximum volume of oil available to external cylinders:	12 dm³ or 27 dm³ with overfill

1.6 THREE-POINT LINKAGE

Category:	2, in conformity with ISO 730-1:1994 + Cor.1:1995
Category adapter:	None





Linkage geometry dimensions:

			Dimension or range	Settings used in test
			mm	mm
Length of lift arms		(A)	330	330
Length of lower links		(B)	892	892
Distance of lift arm pivot point from rear-wheel axis:	horizontally	(a)	150	150
	vertically	(b)	275	275
Horizontal distance between the 2 lower link points		(u)	510	510
Horizontal distance between the 2 lift arm end points		(v)	590	590
Length of upper link		(S)	600 to 870	751
Distance of upper link pivot point from rear-wheel axis:	horizontally	(c)	358	358
	vertically	(d)	125, 195	125
Distance of lower link pivot point from rear-wheel axis:	horizontally	(e)	150	150
	vertically	(f)	245	245
Distance of lower link pivot points to lift rod pivot points on lower links		(D)	500	500
Length of lift rods		(L)	588 to 724	662
Height of lower hitch points relative to the rear-wheel axis:				
	in low position	(h)	521 to 793	620
	in high position	(H)	-44 to 180	150
Height above ground of lower hitch points when locked in transport position (*)			Any height withing lift range	
(*) Assuming r=820 mm tyre dynamic radius index of ISO 4251-1:1998				

1.7 SWINGING DRAWBAR

Type:	Clevis
Height above ground	
Maximum:	428 mm
Minimum:	428 mm
Type of adjustment:	None
Distance of hitch point from rear-wheel axis, horizontally:	879 mm
Distance of hitch point from power take-off shaft end	
Vertically:	267 mm
Horizontally:	399 mm
Lateral adjustment (centre of clevis)	
Right-hand:	80 mm
Left-hand:	80 mm
Distance of pivot point from rear-wheel axis, horizontally:	201 mm to rear
Diameter of drawbar pin hole:	31 mm
Maximum vertical permissible load:	12 kN

1.8 TRAILER HITCH

Type:	Automatic clevis
Hole diameter:	35 mm
Height above ground:	720, 820 and 920 mm
Distance of hitch point from rear-wheel axis, horizontally:	860 mm
Distance of hitch point from power take-off shaft end	
Vertically:	25, 125 and 225 mm
Horizontally:	380 mm
Maximum vertical permissible load:	10 kN

1.9 HOLED DRAWBAR (on request available, not fitted to tested tractor)

Number of holes:	7
Distance between holes:	80 mm
Hole diameter:	32 mm
Thickness/width of the drawbar:	2×20 mm/90 mm
Height above ground	
Maximum:	970 mm
Minimum:	200 mm
Horizontal distance to power take-off shaft end (rear):	562 mm

1.10 SEMI-TRAILER HITCH

Type:	Towing hook
Hole diameter:	47 mm
Height above ground:	453 mm
Distance of hitch point from rear-wheel axis, horizontally:	584 mm
Distance of hitch point from power take-off shaft end	
Vertically:	242 mm
Horizontally:	104 mm
Maximum vertical permissible load:	18 kN

1.11 FRONT TOWING HITCH

Height above ground:	872 mm
Diameter of pin hole:	33 mm

1.12 STEERING

Make, model and type:	DANFOSS, OSPC 125 ON 150N 2019 or EATON, 261-1356-002 or REXROTH, LAGC 125N 10/180-125/01, hydrostatic
Method of operation:	Independent hydraulic circuit for steering
Pump(s):	Gear pump, driven from engine
Ram(s):	Double-acting cylinder on the front axle, simmetrical design
Working pressure:	12.5 MPa

1.13 BRAKES

1.13.1 Service brake

Rear axle

Make, model and type:	ZETOR, 16.227.000, wet disc, multiplate, 4 discs on each side
Method of operation:	Hydraulically by pedals, coupled or independent

Front axle

Make, model and type:	ZETOR, 16.225.000, dry disc on the drive shaft to the front axle
Method of operation:	Hydraulically by coupled pedals
Trailer braking take-off:	Combined one line and two line air braking system and hydraulic braking system, actuated by tractor pedals

1.13.2 Parking brake

Type:	Common with service brake
Method of operation:	Mechanically by hand lever with ratchet

1.14 WHEELS

Number

Front:	2, steering and driving
Rear:	2, driving
Wheelbase:	2643 mm

Track width adjustment:

	Minimum	Maximum	Adjustment method
	mm	mm	
Front	1625	1860	Reversing wheels and off-set lug rims
Rear	1500	1800	Reversing wheels and off-set lug rims

1.15 PROTECTIVE STRUCTURE

Make, model and type:	ZETOR, UBK 7641, cab with integrated frame

Manufacturer's name and address:	ZETOR a.s., CZ-632 00 Brno, Czech Republic
Protective device	
Cab/frame/rollguard/other:	Cab
Tiltable/not tiltable:	Not tiltable
OECD approval	
Approval number:	4/0730
Date of approval:	20th June 2002
Nos. of minor modification certificates, if any:	None

1.16 SEAT

1.16.1 Driver's seat

Make, model and type:	GRAMMER, DS 85H1/90A, upholstered seat with back rest and arm rests
Seat and steering wheel reversible:	No
Type of suspension:	Parallelogram linkage adjustable for driver's weight
Type of damping:	Hydraulic
Range of adjustment	
Longitudinally:	150 mm
Vertically:	60 mm
Safety belt:	No

1.16.2 Optional driver's seat(s)

Make	Model	Type of suspension	Type of damping	Range of adjustment	
				Longitudinally	Vertically
				mm	mm
COBO-MT	SC80 1204 B4	Mechanic	Hydraulic	160	110
COBO-MT	SC81 1204 G4	Mechanic	Hydraulic	160	110
COBO-MT	SC81 1213 G4	Mechanic	Hydraulic	160	110
COBO-MT	SC90 1318 B4	Mechanic	Hydraulic	160	110
GRAMMER	DS 85H/3A	Mechanic	Hydraulic	150	60
GRAMMER	Maximo M	Pneumatic	Hydraulic	210	80
GRAMMER	Maximo XL	Pneumatic	Hydraulic	210	80
GRAMMER	Maximo XXL	Pneumatic	Hydraulic	210	80
MARS	Zetor 7211 5400	Mechanic	Hydraulic	150	60
MARS	Zetor 7211 5418	Mechanic	Hydraulic	150	60

Type:	Upholstered seat with back rest and arm rests
Safety belt:	No

1.16.3 Passenger seat

Location: Left-hand side of driver

Capacity (number): 1

1.17 LIGHTING

	Height above ground of centre	Size	Distance from outside edge of lights to median plane of tractor
	mm	mm	mm
Headlights	1270	145×80	200
Sidelights	1620	60×65	795
Rearlights	1905	140×40	815
Reflectors – 1st pair	1400	Ø78	905
Reflectors – 2nd pair	755	Ø78	440

2. TEST CONDITIONS

2.1 OVERALL DIMENSIONS (unballasted tractor)

Length	Width		Height at top of	
	minimum	maximum	protective structure	exhaust pipe
mm	mm	mm	mm	mm
5105	2190	2315	2780	2785

2.2 GROUND CLEARANCE (unballasted tractor): 362 mm

Clearance-limiting part: Swinging drawbar bracket

2.3 TRACTOR MASS (unballasted tractor with cab)

	Without driver	With driver
	kg	kg
Front	1915	1920
Rear	2715	2785
Total	4630	4705

2.4 TYRES AND TRACK WIDTH SPECIFICATIONS

	Front	Rear
Tyres:		
Make	BARUM	BARUM
Model	TZR 2	TZR 2
Dimensions	14.9 R 24	18.4 R 38
Ply rating	126 A8	146 A8
Type	Radial	Radial
Maximum load (tyre manufacturer's)	19.00 kN	33.50 kN
Maximum load (tractor manufacturer's)	11.75 kN	25.75 kN
Inflation pressure (tyre manufacturer's)	160 kPa	160 kPa
Dynamic radius index	590 mm	820 mm
Chosen track width:	1710 mm	1735 mm

2.5 FUEL

Type:	Diesel fuel, in conformity with national standard ČSN EN 590
Density at 15 °C:	0.839 g/cm³ for p.t.o. tests 0.835 g/cm³ for drawbar tests

2.6 OILS AND LUBRICATIONS

2.6.1 Capacity and change interval

	Capacity	Oil change	Filter change
	dm³	h	h
Engine	15.0	300	300
Gear box	40.0	1200	1200
Front axle	6.5	1200	-
Rear axle		Common with gear box	
Final drive (front)	2×0.6	1200	-
Final drive (rear)		Common with gear box	
Hydraulic system		Common with gear box	
Steering	4.5	2400	2400

2.6.2 Specifications

	Recommended	Used during test
Engine oil: Type Viscosity Classification	 SAE 15W-40 12.5 cSt at 100 °C API CF (MIL-L-2104E)	As recommended
Transmission oils: Type Viscosity Classification	 SAE 80W 7.5 cSt at 100 °C API GL-4	As recommended
Steering oil: Type Viscosity Classification	 OH - HM32 28.8 cSt at 40 °C ISO 6743-L-HM32	As recommended

Hydraulic fluid: Same as transmission

2.6.3 Grease

Number of lubrication points: 18

3. COMPULSORY TESTS RESULTS

3.1 MAIN POWER TAKE-OFF

Date and location of tests: 10th October 2002, SZZPLS Praha

Type of dynamometer bench: FROUDE AG 400, eddy-current

Power	Speed		Fuel consumption			Specific energy
	Engine	P.T.O.	Hourly		Specific	
kW	rev/min	rev/min	kg/h	l/h	g/kWh	kWh/l
3.1.1 MAXIMUM POWER – TWO-HOUR TEST						
80.9	2299	1179	21.58	25.72	267	3.15
3.1.2 POWER AT RATED ENGINE SPEED						
79.6	2350	1205	21.65	25.80	272	3.09
3.1.3 STANDARD POWER TAKE-OFF SPEED [1000±25 rev/min]						
77.7	1950	1000	18.69	22.28	241	3.49
3.1.4 PART LOADS 3.1.4.1 the torque corresponding to maximum power at rated engine speed						
79.6	2350	1205	21.65	25.80	272	3.09
3.1.4.2 85 % of torque obtained in 3.1.4.1						
69.0	2397	1229	19.86	23.67	288	2.92
3.1.4.3 75 % of torque defined in 3.1.4.2						
52.6	2434	1248	16.63	19.82	316	2.65
3.1.4.4 50 % of torque defined in 3.1.4.2						
35.5	2469	1266	13.47	16.05	379	2.21
3.1.4.5 25 % of torque defined in 3.1.4.2						
17.9	2490	1277	10.02	11.94	560	1.50
3.1.4.6 unloaded						
-	2519	1292	7.32	8.72	-	-

Power	Speed		Fuel consumption			Specific energy
	Engine	P.T.O.	Hourly		Specific	
kW	rev/min	rev/min	kg/h	l/h	g/kWh	kWh/l
3.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED [1000±25 rev/min] 3.1.5.1 the torque corresponding to maximum power						
77.7	1950	1000	18.69	22.28	241	3.49
3.1.5.2 85 % of torque obtained in 3.1.5.1						
67.7	1999	1025	16.74	19.95	247	3.39
3.1.5.3 75 % of torque defined in 3.1.5.2						
51.3	2020	1036	13.61	16.22	265	3.16
3.1.5.4 50 % of torque defined in 3.1.5.2						
34.8	2053	1053	10.58	12.61	304	2.76
3.1.5.5 25 % of torque defined in 3.1.5.2						
17.6	2075	1064	7.55	9.00	429	1.96
3.1.5.6 unloaded						
-	2106	1080	4.91	5.85	-	-

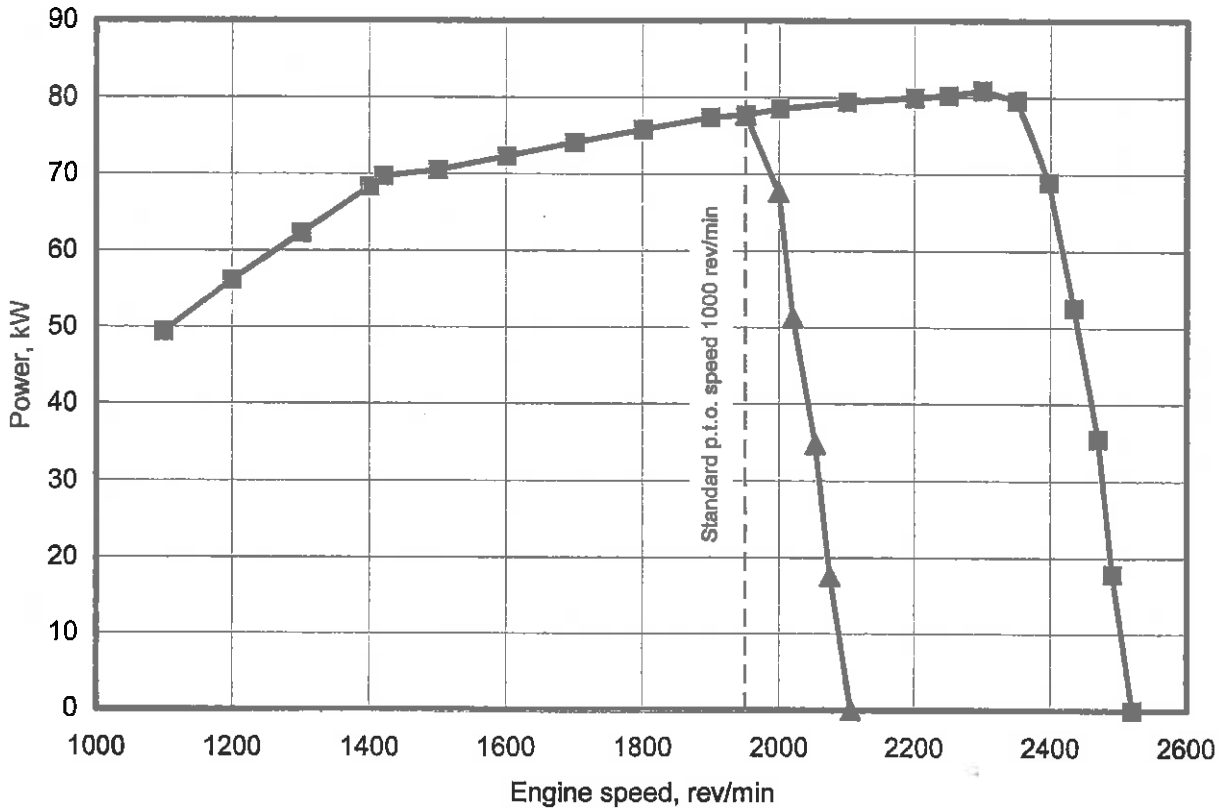
No load maximum engine speed: 2519 rev/min

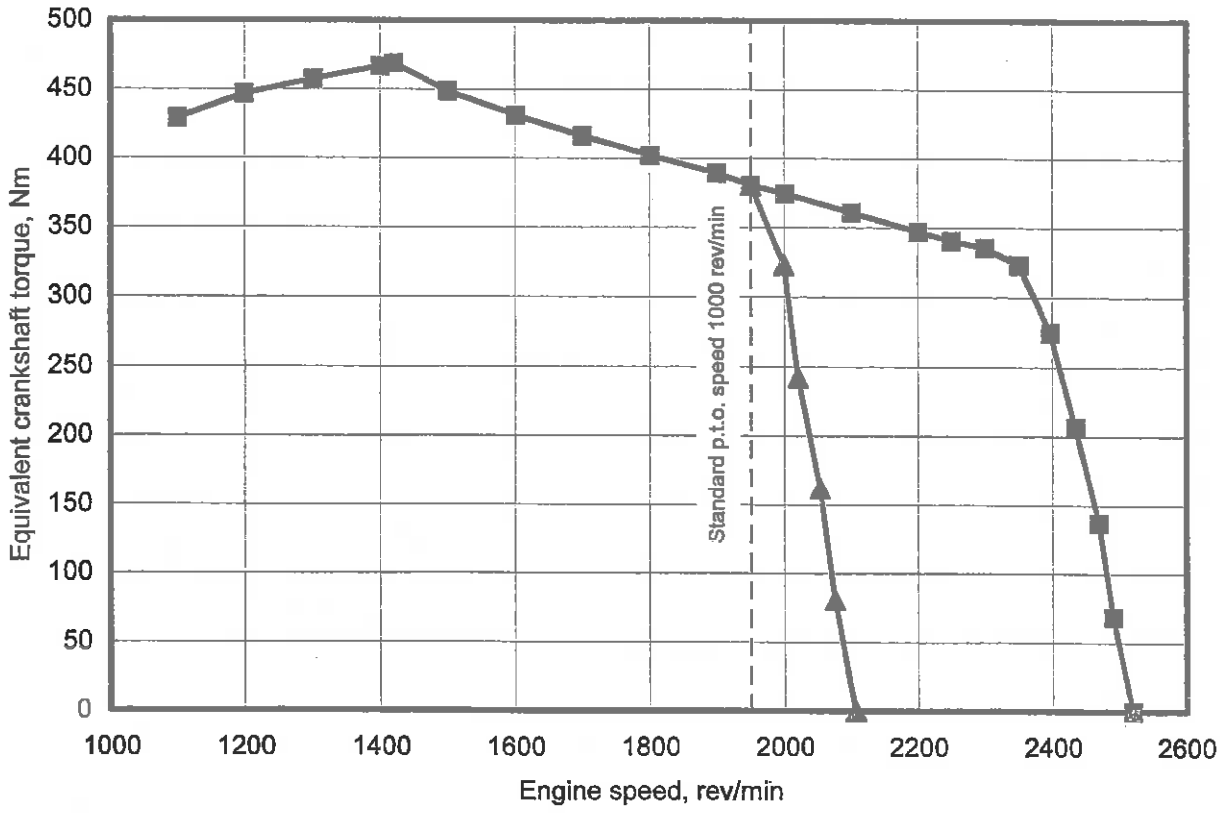
Torque (equivalent crankshaft)
At maximum power: 336.0 Nm
At rated engine speed: 323.5 Nm
At standard power take-off speed: 380.5 Nm

Maximum torque (equivalent crankshaft): 468.7 Nm
(engine speed: 1420 rev/min)

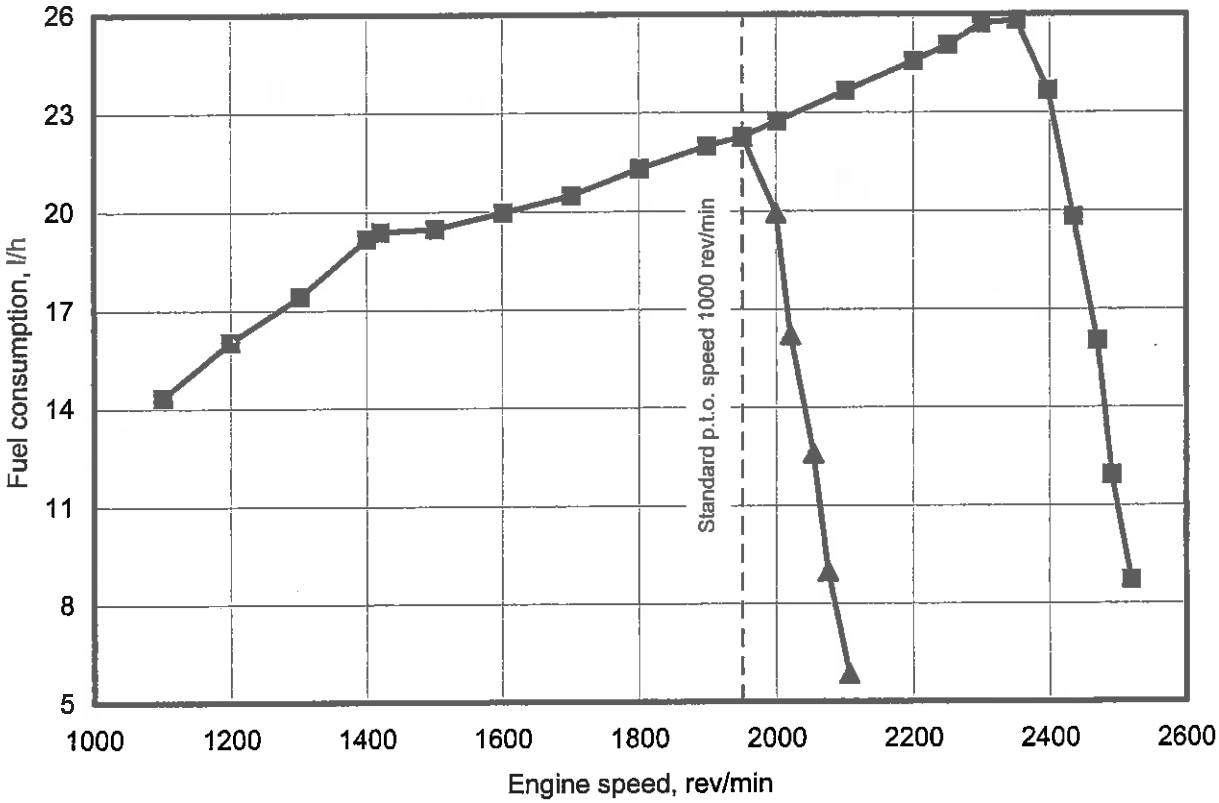
Mean atmospheric conditions:	
Temperature	20 °C
Pressure	96.6 kPa
Relative humidity	37 %
Maximum temperatures:	
Coolant	90 °C
Engine oil	123 °C
Fuel	40 °C
Engine air intake	31 °C

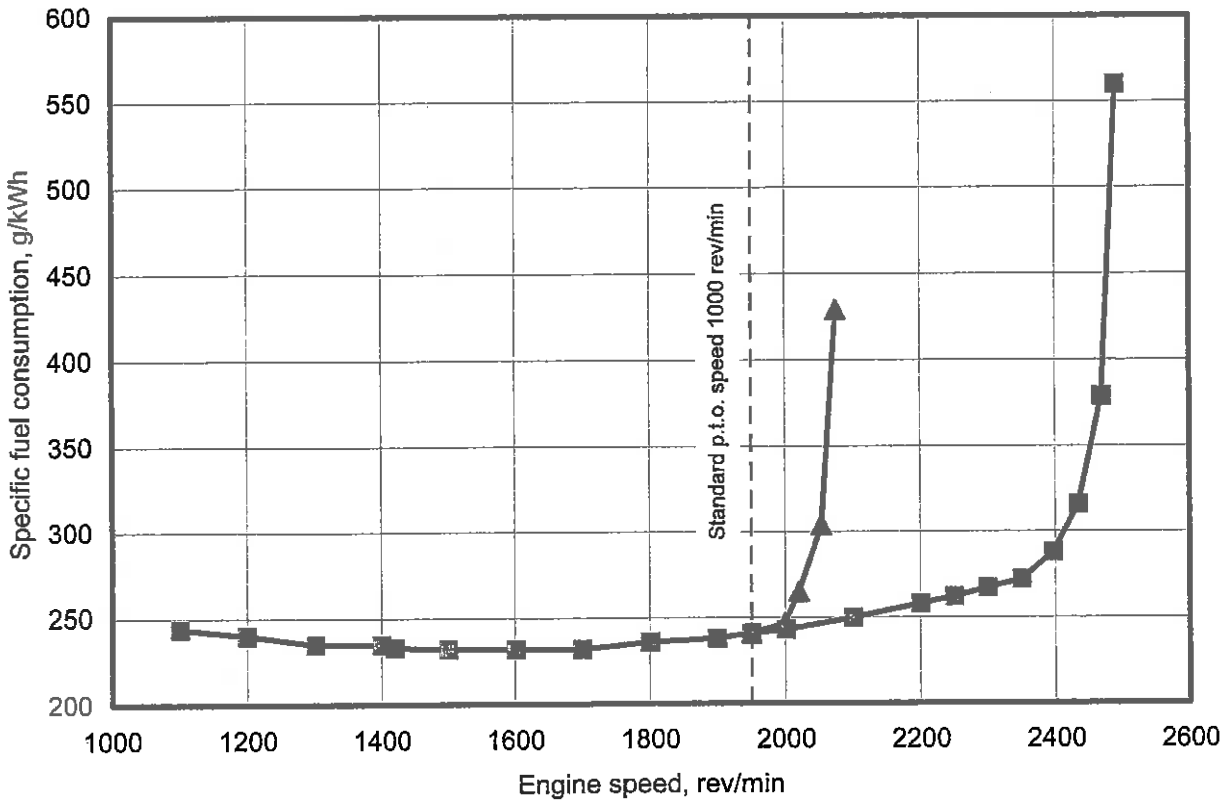
POWER TAKE-OFF TEST



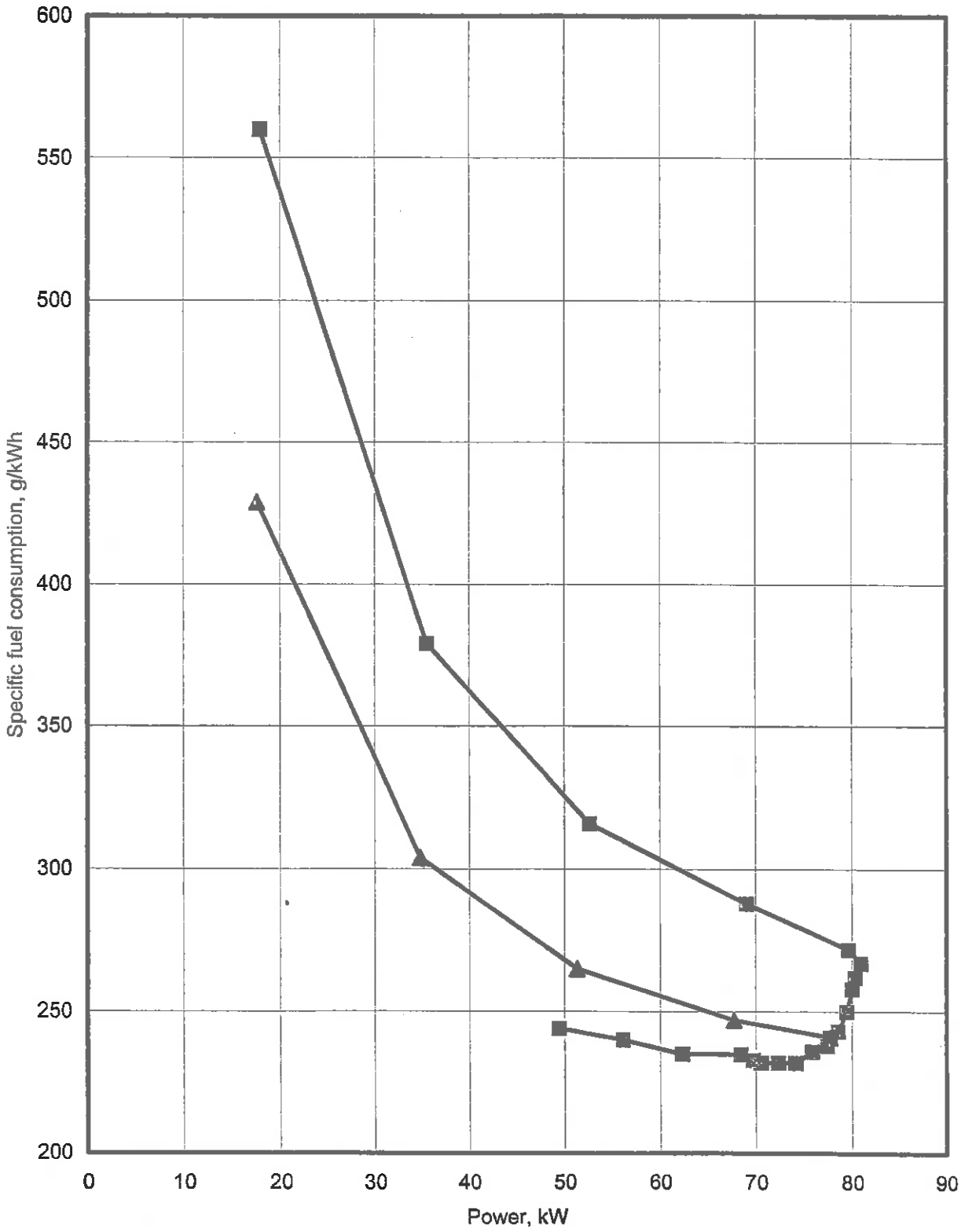


POWER TAKE-OFF TEST





POWER TAKE-OFF TEST



3.2 HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 30th and 31st October 2002

3.2.1 Hydraulic power test

Sustained pressure with relief valve open: 19.8 MPa

Pump stalled: No

Pump delivery rate at minimum pressure: 64.0 l/min

	Flow rate	Pressure	Power
	l/min	MPa	kW
Flow rate corresponding to a hydraulic pressure equivalent to 90 % of the actual relief valve pressure setting and corresponding hydraulic power	35.9	17.8	10.7
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	38.9	17.0	11.0

Tapping point used for test: External tapping

Temperature of hydraulic fluid: 69 °C

Opening pressure of the unloading valve: Not applicable

Closing pressures of the unloading valve: Not applicable

3.2.2 Rear power lift test

Linkage setting for test – see page 12

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	200 mm	200 mm
Vertical movement: without lifting force with lifting force	770 mm 728 mm	926 mm 921 mm
Maximum corrected force exerted through full range	52.7 kN	42.2 kN
Corresponding pressure of hydraulic fluid	17.8 MPa	17.8 MPa
Moment about rear-wheel axis	54.9 kNm	69.7 kNm
Maximum tilt angle of mast from vertical	-	13 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points													
mm	-490	-400	-375	-300	-200	-100	0	+100	+200	+300	+353	+400	+431
Lifting forces at the hitch points (the values of force measured shall be corrected to correspond to a hydraulic pressure equivalent to 90 % of the actual relief valve pressure setting of the hydraulic lift system)													
kN	-	-	52.7	55.3	57.9	59.7	60.5	61.2	61.3	61.2	57.3	-	-
Corresponding pressure: 17.8 MPa													
Lifting forces at the test frame													
kN	43.2	46.5	-	53.3	52.0	47.8	46.4	49.4	44.0	48.5	-	42.2	48.4
Corresponding pressure: 17.8 MPa													

3.3 DRAWBAR POWER TEST (unballasted tractor)

Date of tests: 24th October 2002

Type of track: Bituminous-concrete surface

Height of drawbar above ground	Tyre inflation pressure	
	Front	Rear
mm	kPa	kPa
453	120	110

Gear number and group	Power	Drawbar pull	Speed	Engine speed	Slip of wheels	Specific fuel consumption
	kW	kN	km/h	rev/min	%	g/kWh
3.3.1 MAXIMUM POWER IN TESTED GEARS (unballasted tractor)						
3 Lo L	49.0	43.0	4.10	2381	15.0	390
3 Lo M	56.7	43.0	4.75	2381	15.0	377
3 Lo H	64.8	40.5	5.76	2345	9.5	342
4 Lo L	68.2	38.7	6.34	2352	7.0	326
4 Lo M	69.1	33.1	7.51	2353	5.0	322
1 Hi L	71.2	31.8	8.06	2346	4.2	313
4 Lo H	70.5	29.4	8.63	2312	3.9	313
1 Hi M	71.5	27.8	9.26	2311	3.4	310
1 Hi H	70.3	23.6	10.73	2305	2.9	309
2 Hi L	70.8	20.4	12.49	2311	2.3	310
3.3.2 FUEL CONSUMPTION 3.3.2.1 in selected gear, at maximum power at rated speed						
1 Hi M	70.6	27.0	9.41	2347	3.2	314
3.3.2.1.1 75 % of pull at maximum power at rated speed						
1 Hi M	54.6	20.3	9.68	2380	2.2	344
3.3.2.1.2 50 % of pull at maximum power at rated speed						
1 Hi M	36.9	13.7	9.70	2381	1.4	401
3.3.2.1.3 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.1						
1 Hi H	54.6	20.4	9.64	2055	2.3	305
3.3.2.1.4 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.2						
1 Hi H	37.5	13.9	9.71	2054	1.7	340
3.3.2.2 in selected gear nearest to 7.5 km/h at rated speed						
4 Lo M	69.1	33.1	7.51	2353	5.0	322
3.3.2.2.1 75 % of pull at maximum power at rated speed						
4 Lo M	53.1	24.7	7.74	2381	3.0	349
3.3.2.2.2 50 % of pull at maximum power at rated speed						
4 Lo M	35.8	16.4	7.85	2381	1.8	401
3.3.2.2.3 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.1						
1 Hi L	53.9	24.8	7.82	2250	3.1	320
3.3.2.2.4 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.2						
1 Hi L	36.3	16.5	7.91	2253	1.9	369

Specific energy	Temperature			Atmospheric conditions		
	Fuel	Coolant	Engine oil	Temperature	Relative humidity	Pressure
kWh/l	°C	°C	°C	°C	%	kPa
2.03	25	92	101	10	60	96.6
2.22	22	91	98	8	66	96.7
2.45	25	89	102	9	66	96.7
2.57	24	92	102	9	64	96.7
2.60	26	92	103	9	65	96.7
2.68	22	93	101	9	65	96.7
2.68	24	93	104	8	66	96.7
2.71	23	93	103	8	72	96.7
2.71	24	93	104	7	74	96.8
2.71	25	93	106	7	76	96.8
2.67	23	93	103	8	72	96.7
2.44	22	93	98	6	80	96.8
2.09	21	93	102	6	80	96.8
2.75	21	92	98	6	81	96.8
2.47	21	92	98	6	81	96.8
2.60	26	92	103	9	65	96.7
2.41	27	93	100	9	65	96.7
2.09	25	93	101	9	65	96.7
2.62	24	92	102	9	65	96.7
2.28	22	92	98	9	65	96.7

4. OPTIONAL TESTS RESULTS

4.1 BRAKING

Date of tests: 21st and 23rd October 2002

Tractor mass (with driver)

	Front	Rear	Total
	kg	kg	kg
Ballasted tractor	3000	5500	8500
Unballasted tractor	1920	2785	4705

4.1.1 Cold service braking device test

	Speed before application of brakes	Braking device control force	Mean deceleration	Minimum stopping distance without locking the wheels
	km/h	kN	m/s²	m
Ballasted tractor	39.3	0.100	0.64	93.10
		0.210	1.47	40.54
		0.285	3.10	19.22
		0.350	4.10	14.53
		0.425	4.71	12.65
Unballasted tractor	39.5	0.105	1.04	57.88
		0.145	1.51	39.86
		0.200	2.36	25.51
		0.245	4.87	12.36

Maximum deviation of tractor from its original course: Not significant

Abnormal vibration: None

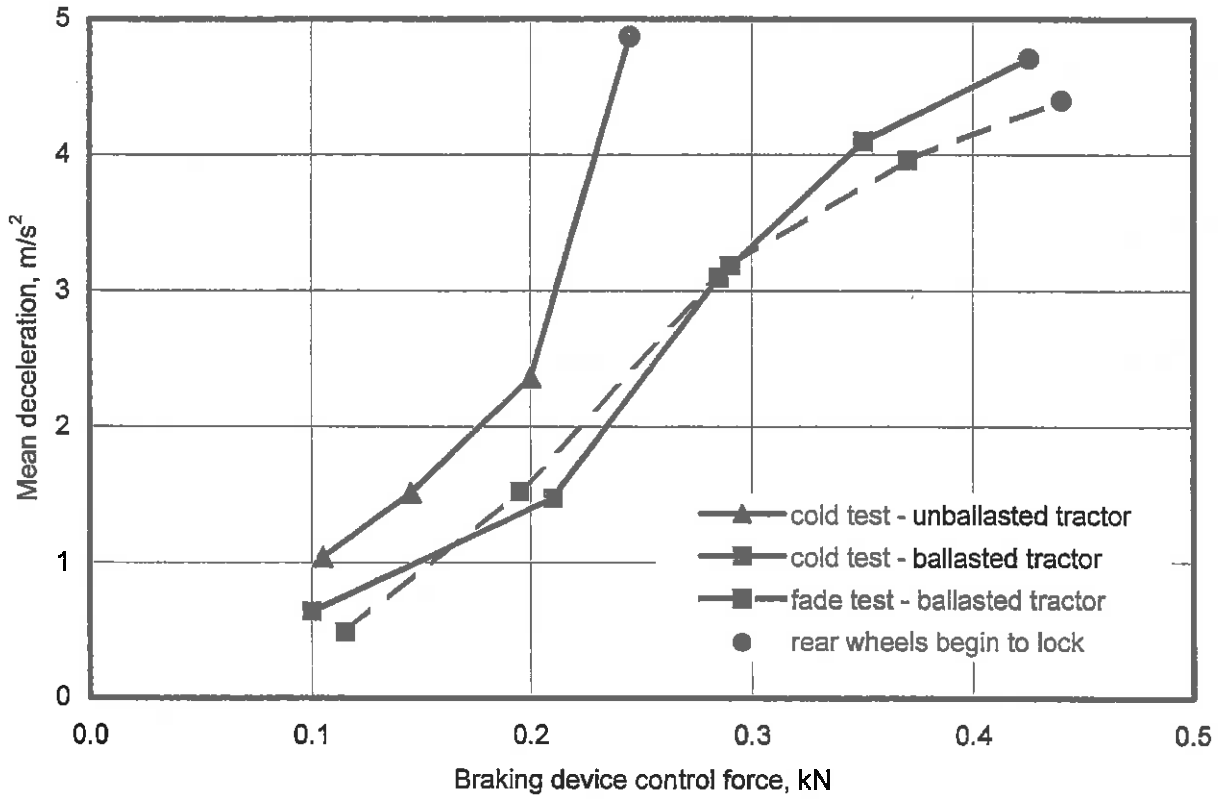
4.1.2 Fade test

	Speed before application of brakes	Braking device control force	Mean deceleration	Minimum stopping distance without locking the wheels
	km/h	kN	m/s²	m
Ballasted tractor	39.3	0.115	0.49	121.61
		0.195	1.52	39.20
		0.290	3.19	18.68
		0.370	3.96	15.05
		0.440	4.40	13.54

Maximum deviation of tractor from its original course: Not significant

Abnormal vibration: None

Brake heating method: Driven with brakes applied for 1 km at 80 % of maximum speed with a pedal force corresponding to a deceleration of 1 m/s²



4.1.3 Parking braking device test

	Ballasted tractor on 18 % slope	
	Uphill	Downhill
	kN	kN
Braking device control force	0.250	0.230

4.2 MEASUREMENT OF EXTERNAL NOISE

Date of tests: 11th October 2002

Make and model of sound level meter: BRÜEL & KJÆR, 2231

Type of track: Bituminous-concrete surface

4.2.1 According to OECD standard code 1

Gear number: 4 Hi H

Travelling speed before acceleration: 29.8 km/h

Sound level: 85.5 dB(A)

4.2.2 According to EEC directives 74/151/EEC (Annex VI) and 97/54/EC

Gear number:	4 Hi H
Travelling speed before acceleration:	29.8 km/h
Sound level:	84.5 dB(A)

5. REPAIRS

None

6. REMARKS

None

Test carried out by: Dipl. Ing. Peter Pernis

Head of the Tractor Laboratory

Dipl. Ing. Peter Pernis

STÁTNÍ ZKUŠEBNA ZEMĚDĚLSKÝCH, POTRAVINÁŘSKÝCH A LESNÍCH STROJŮ
SZZPLS
zkušební laboratoř

Director

Dipl. Ing. Josef Šenk, CSc.