STÁTNÍ ZKUŠEBNA ZEMĚDĚLSKÝCH, POTRAVINÁŘSKÝCH A LESNICKÝCH STROJŮ

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Extension of validity of a test made 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 № 2/1 796/1

Date of approval: 28th August 2002



Agricultural Tractor

ZETOR 8641 Forterra (4WD) 40 km/h version

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

Report № 22432

Date of test: May 2002

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GENERAL NOTE

SZZPLS Praha is still the official Czech Republic Test Station for carrying out Tests in accordance with the OECD Standard Codes for the Official Testing of Agricultural and Forestry Tractors.

Checking for the extension test report

Location:	SZZPLS Praha, Czech Republic
Date of checking:	21st May 2002

This extension of validity for an original test has been approved by the OECD Co-ordinating Centre in Antony (France), as being in accordance with OECD Standard Code for the Official Testing of Agricultural and Forestry Tractors – Code 2.

OECD approval number:	2/1 796/1
Date of approval:	28th August 2002

ORIGINAL TEST REPORT

The specifications of the tractor and the results of the performance test are taken from the report number:

OECD approval number:	2/1 796
Date of approval:	26th November 1998
Make, model and type of tractor:	ZETOR, 8641 Forterra turbo 40 km/h version, 4WD
Manufactured by:	ZETOR a.s., CZ-632 00 Brno, Czech Republic
Submitted for test by:	The manufacturer

The differences between the tractors ZETOR 8641 Forterra turbo (4WD) 40 km/h version and ZETOR 8641 Forterra (4WD) 40 km/h version are written in *italics*, taking into account these differences, SZZPLS Praha has reproduced the main power take-off test and measurement of external noise and considers that the other results of reference test are valid for the tractor for which the extension is asked.

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
Place of running-in:	Brno, Czech Republic
Duration of running-in:	28 hours
Location of test:	SZZPLS Praha, Czech Republic

1. SPECIFICATIONS OF TRACTOR

1.1 IDENTIFICATION

Make of the tractor:	ZETOR
Model (trade name):	8641 Forterra turbo 40 km/h version *8641 Forterra 40 km/h version*
Type:	4WD

1.1.1 Numbers

1st Serial № or prototype:	001 001 *R864101001B*
Serial №:	001 001 *R864101001B*

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:	ZETOR
Model:	1203
Type:	4-stroke diesel engine, direct injection, water cooled, turbocharged
Serial №:	*1203-001003* **1203-001009**

1.2.1 Cylinders

Number/disposition:	4, in-line, vertical
Bore/stroke:	105 mm/120 mm
Capacity:	4156 cm³
Compression ratio:	17.0:1
Arrangement of valves:	Overhead

Cylinder liners:	Wet, replaceable
1.2.2 Supercharging	
Make, model and type:	ČZ, C14 13, exhaust driven
Pressure:	210 kPa
Inercooler:	None
1.2.3 Fuel system	
Fuel feed system:	Lift pump piston-type, integral with fuel injection pump
Make, model and type of fuel filter(s):	ATESO, 443 741 111 001, one-stage with paper cartridge
Capacity of fuel tank:	180 dm^3
Make, model and type of injection pump:	MOTORPAL, 4M 3460, in-line *MOTORPAL, 4M10P1fN12207, in-line*
Serial №:	ND 0033 *V 9187*
Manufacturer's production setting of injection pump	
Flow rate (rated engine speed and full load):	17.94 to 18.42 dm^3/h
Timing:	14°+1° before TDC
Make, model and type of injectors:	MOTORPAL, VA 76S 160 3013, 4 hole
Injection pressure:	$22.0^{-0.8}$ MPa
Fuel cooler:	None
1.2.4 Governor	
Make, model and type:	MOTORPAL, RV 3M 350 1100 3341, centrifugal, variable speed with overpressure corrector
Governed range of engine speed:	From 700 to 2460 rev/min
Rated engine speed:	2200 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:	SANDRIK, SPP 500, dry with paper primary and safety elements, integrated cyclon type pre-cleaner *MEVA, Mefil 14, 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:	Gerotor
Type of filter(s):	Full flow with replaceable paper element
Number of filters:	1
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:	8
Fan diameter:	460 mm
Coolant capacity:	23.5 dm^3
Type of temperature control:	Thermostat
Superpressure system:	40±10 kPa

1.2.8 Starting system

Make, model and type:	MAGNETON, 443 115 144 763, electrical, solenoid engaged
Starter motor power rating:	3.5 kW
Cold starting aid:	Four electrical glow plugs
Safety device:	Forward/reverse lever in neutral position *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:	MAGNETON, 443 113 516 673, alternator, belt driven
Power:	980 W
Battery of accumulators	
Number:	1
Rating:	135 Ah at 20 hours

1.2.10 Exhaust system

Make, model and type:	ZETOR, 10.014.000, expansion and absorption muffler *ZETOR, 15.000.0114, expansion and absorption muffler*
Location:	Left-hand side of engine, vertical *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 outboard 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 2200 rev/min km/h (*)
Forward				
1	Lo	L	366.550	1.86
		M	316.639	2.15
		H	273.859	2.48
2		L	254.655	2.67
		M	219.981	3.09
		H	190.260	3.57
3		L	156.748	4.34
		M	135.405	5.02
		H	117.111	5.81
4		L	109.496	6.21
		M	94.586	7.19
		H	81.807	8.31
1	Hi	L	88.657	7.67
		M	76.585	8.88
		H	66.238	10.27
2		L	61.594	11.04
		M	53.207	12.78
		H	46.018	14.78
3		L	37.913	17.94
		M	32.750	20.77
		H	28.326	24.01
4		L	26.484	25.68
		M	22.878	29.73
		H	19.787	34.37
(*) 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 2200 rev/min km/h (*)
Reverse				
1	Lo	L	317.016	2.15
		M	273.850	2.48
		H	236.851	2.87
2		L	220.243	3.09
		M	190.254	3.57
		H	164.549	4.13
3		L	135.566	5.02
		M	117.107	5.81
		H	101.285	6.71
1	Hi	L	76.677	8.87
		M	66.236	10.27
		H	57.287	11.87
2		L	53.270	12.77
		M	46.017	14.78
		H	39.799	17.09
3		L	32.789	20.74
		M	28.325	24.01
		H	24.498	27.76
(*) 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: 1.4490

1.4 POWER TAKE-OFF

1.4.1 Main power take-off

Type: Independent

Method of engagement: Electro-hydraulically actuated muliti-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
1000	34.9	21	Yes

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
	621	2200		
1000	1000	1950	1.9500	None
	1128	2200		

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	0.196	26.2640
	Hi	0.811	6.3525
1000	Lo	0.108	47.7208
	Hi	0.446	11.5422

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: 729 mm
709 mm

Distance from the median plane of the tractor: 0 mm

Distance in front front-wheel axis: 664 mm
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	1000	1955	1.9545	35.0/334.2
	1126	2200		

Direction of rotation (viewed from face tractor): Clockwise

1.4.2.2 Power take-off proportional to ground speed

None

1.5 HYDRAULIC POWER LIFT

1.5.1 Rear 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): $18.0^{+0.2}$ 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, one valve used for front power lift, 4 pressure and 1 return couplings at rear of tractor and 2 pressure and 1 return couplings at right front side of engine *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:	20 dm^3

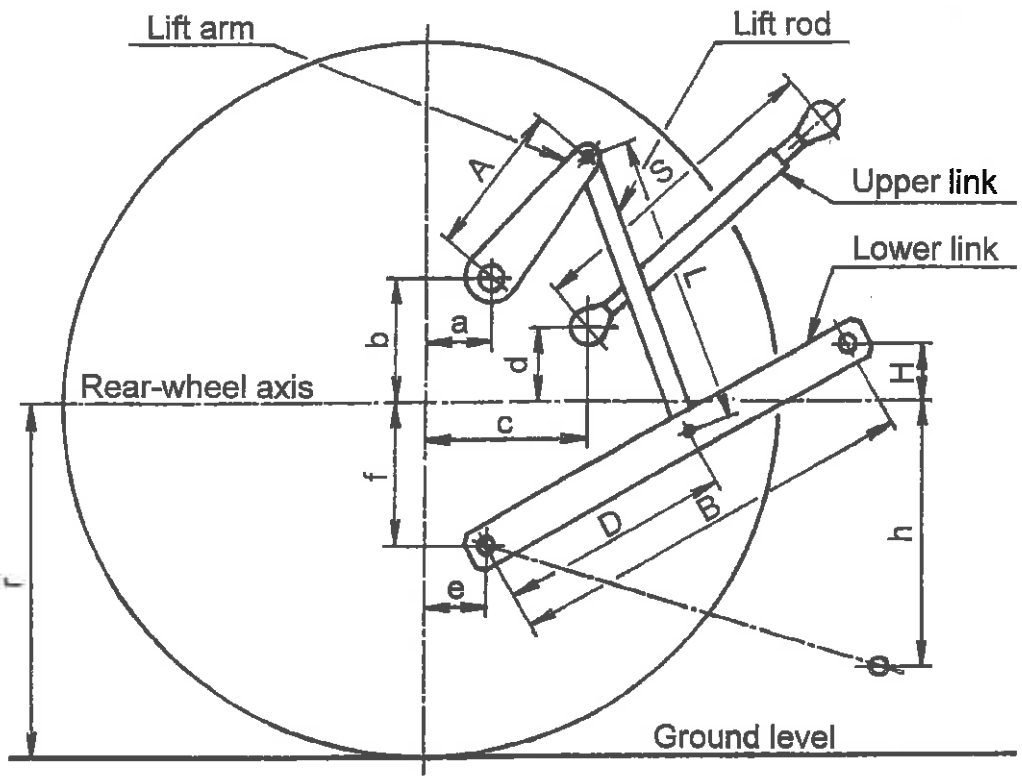
1.5.2 Front power lift *(on request available, not fitted to tested tractor)*

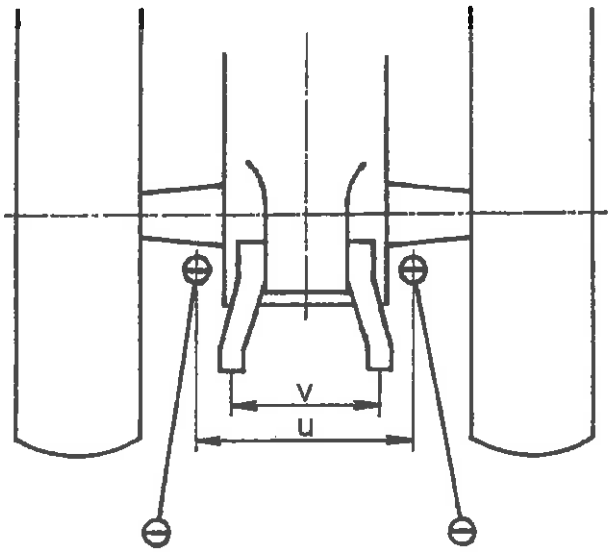
Make, model and type:	ZETOR, 53.940.039, hydraulic *ZETOR, 17.448.000, hydraulic*
Type of hydraulic system:	Open centre
Type and number of cylinders:	2 external single-acting *2 external double-acting*
Type of linkage lock for transport:	Pin lock *Hydraulic*
Relief valve pressure setting (tolerance):	$18.0^{+0.2}$ MPa $18.8^{+1.3}$ *MPa*
Opening pressure of cylinder safety valve:	Safety valve is not fitted
Lift pump type:	Same as rear power lift
Transmission between pump and engine:	Same as rear power lift
Type and number of filters:	Same as rear power lift
Site of oil reservoir:	Same as rear power lift
Type, number and location of tapping points:	Same as rear power lift
Maximum volume of oil available to external cylinders:	Same as rear power lift

1.6 THREE-POINT LINKAGE

1.6.1 Rear three-point linkage

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



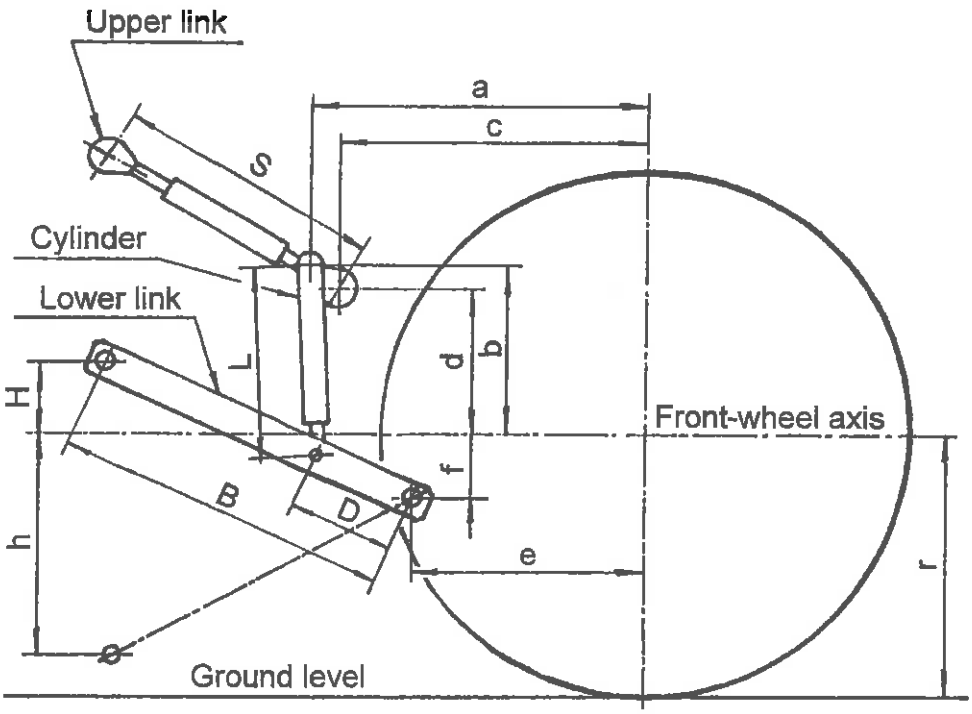


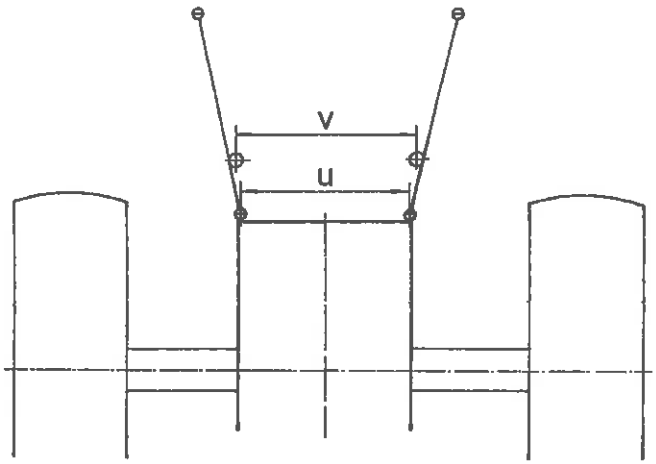
Linkage geometry dimensions:

			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	672
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	626
Height of lower hitch points relative to the rear-wheel axis:				
	in low position	(h)	521 to 793	595
	in high position	(H)	-44 to 180	125
Height above ground of lower hitch points when locked in transport position (*)			Any height withing lift range	
(*) Assuming r=795 mm tyre dynamic radius index of ISO 4251-1:1998				

1.6.2 Front three-point linkage *(on request available, not fitted to tested tractor)*

Category:	2, in conformity with 8759-2:1985
Category adapter:	None





Linkage geometry dimensions:

			Dimension or range	Settings used in test
			mm	mm
Length of lower links		(B)	760 *747*	760
Distance of lift arm pivot point from front-wheel axis:	horizontally	(a)	763 *734*	763
	vertically	(b)	377 *357*	377
Horizontal distance between the 2 lower link points		(u)	570 *428*	570
Horizontal distance between the 2 lift arm end points		(v)	575 *428*	575
Length of upper link		(S)	540 to 800 *540 to 700*	588
Distance of upper link pivot point from front-wheel axis:	horizontally	(c)	695 *655*	695
	vertically	(d)	326 *337*	326
Distance of lower link pivot point from front-wheel axis:	horizontally	(e)	518 *566*	518
	vertically	(f)	144 *141*	144
Distance of lower link pivot points to lift rod pivot points on lower links		(D)	240 *259*	240
Length of lift rods		(L)	428 to 680 *365 to 615*	428 to 680
Height of lower hitch points relative to the front-wheel axis:				
	in low position	(h)	429 *467*	429
	in high position	(H)	332 *254*	332
Height above ground of lower hitch points when locked in transport position (*)			922 *844*	922
(*) Assuming r=590 mm tyre dynamic radius index of ISO 4251-1:1998				

1.7 SWINGING DRAWBAR

Type:	Clevis
Height above ground Maximum: Minimum:	 428 mm 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:	945 mm
Minimum:	225 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, hydrostatic *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 *Combined one line and two line air 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:	2388 mm *2397 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 7621, cab with integrated safety frame
ZETOR, UBK 7641, cab with integrated safety 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: 4/0527
4/0730

Date of approval: 4th June 1998
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
MARS	Zetor 7211 5400	Mechanic	Hydraulic	150	60
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	1285 *1270*	145×80	215 *200*
Sidelights	1655 *1620*	60×65	650 *795*
Rearlights	1845 *1905*	140×40	815
Reflectors – 1st pair	1360 *1400*	Ø78	890 *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
4815 *4245*	2165 *2190*	2315	2715 *2780*	2840 *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	1855 *1725*	1870 *1740*
Rear	2535 *2530*	2595 *2590*
Total	4390 *4255*	4465 *4330*

2.4 TYRES AND TRACK WIDTH SPECIFICATIONS

	Front	Rear
Tyres:		
Make	TAURUS *BARUM*	BARUM
Model	Energysaver Radial HT *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)	17.00 kN	30.00 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:	0.832 g/cm³ for p.t.o. tests *0.835 g/cm³ for p.t.o. supplementary tests on modified tractor* 0.840 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	10.0	200	200
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 13.8 cSt at 100 °C API SF/CC	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: 20

3. COMPULSORY TESTS RESULTS

3.1 MAIN POWER TAKE-OFF

Date and location of tests: 27th March 1998, 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						
56.4	2049	1051	15.13	18.19	268	3.10
3.1.2 POWER AT RATED ENGINE SPEED						
53.4	2200	1128	15.29	18.38	286	2.91
3.1.3 STANDARD POWER TAKE-OFF SPEED [1000±25 rev/min]						
55.6	1950	1000	14.58	17.52	262	3.17
3.1.4 PART LOADS 3.1.4.1 the torque corresponding to maximum power at rated engine speed						
53.4	2200	1128	15.29	18.38	286	2.91
3.1.4.2 85 % of torque obtained in 3.1.4.1						
46.1	2233	1145	13.96	16.78	303	2.75
3.1.4.3 75 % of torque defined in 3.1.4.2						
35.0	2264	1161	11.96	14.38	342	2.43
3.1.4.4 50 % of torque defined in 3.1.4.2						
23.6	2289	1174	9.90	11.90	419	1.98
3.1.4.5 25 % of torque defined in 3.1.4.2						
11.9	2307	1183	7.82	9.40	657	1.27
3.1.4.6 unloaded						
-	2340	1200	5.76	6.92	-	-

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						
55.6	1950	1000	14.58	17.52	262	3.17
3.1.5.2 85 % of torque obtained in 3.1.5.1						
50.0	2063	1058	13.78	16.56	276	3.02
3.1.5.3 75 % of torque defined in 3.1.5.2						
38.2	2100	1077	11.59	13.93	303	2.74
3.1.5.4 50 % of torque defined in 3.1.5.2						
25.8	2133	1094	9.41	11.31	365	2.28
3.1.5.5 25 % of torque defined in 3.1.5.2						
13.1	2159	1107	7.22	8.68	551	1.51
3.1.5.6 unloaded						
-	2184	1120	5.06	6.08	-	-

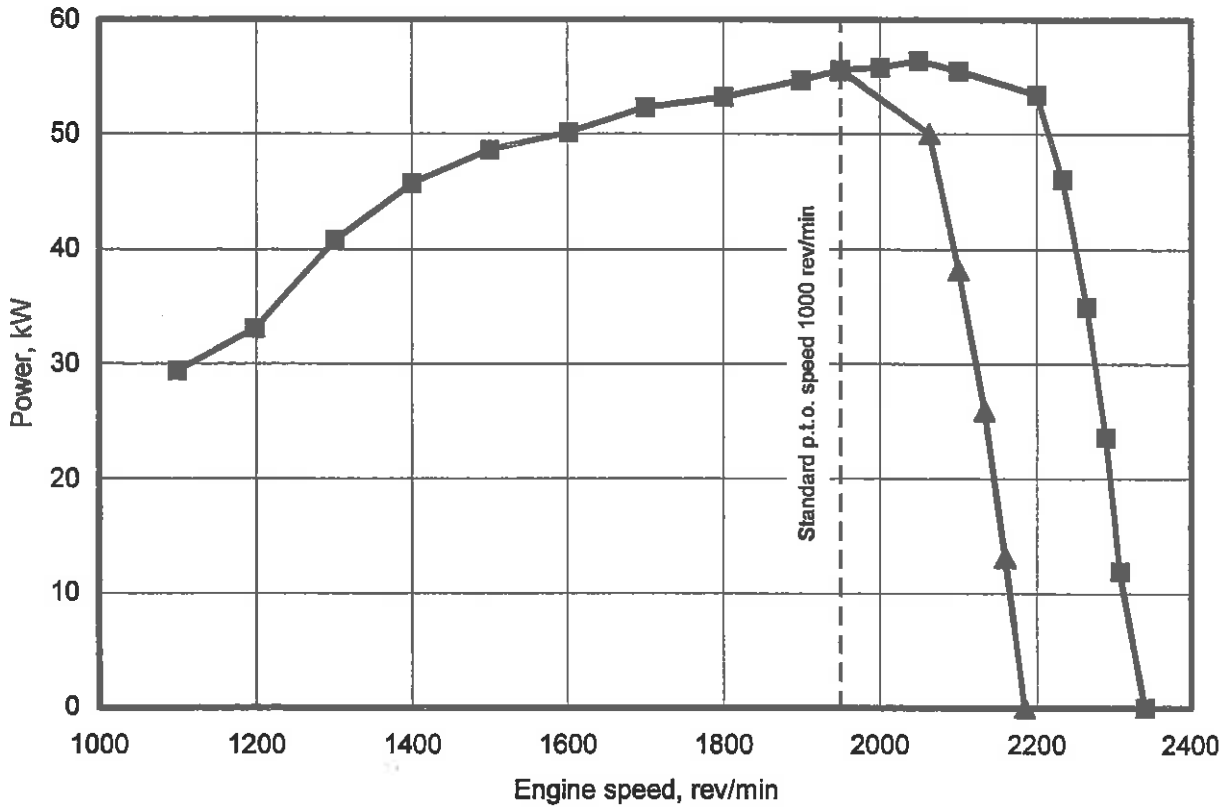
No load maximum engine speed: 2340 rev/min

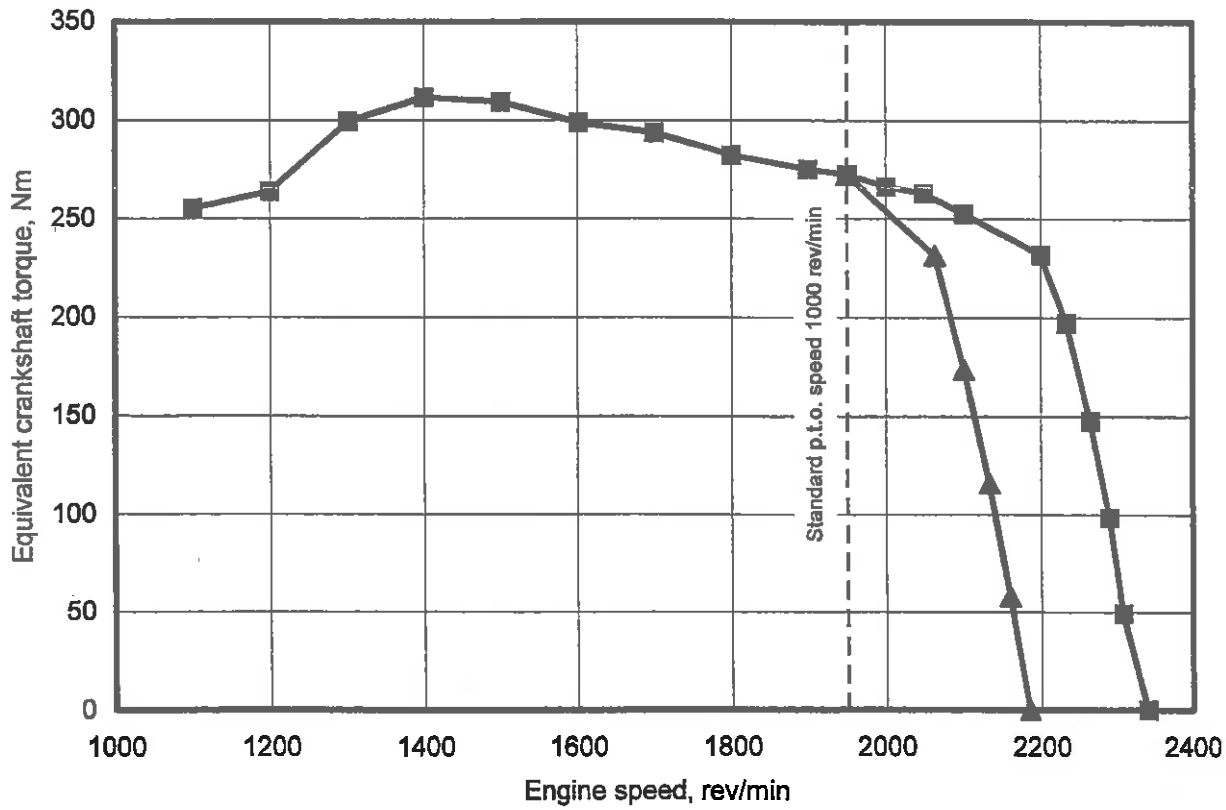
Torque (equivalent crankshaft)
At maximum power: 262.9 Nm
At rated engine speed: 231.8 Nm
At standard power take-off speed: 272.3 Nm

Maximum torque (equivalent crankshaft): 311.7 Nm
(engine speed: 1400 rev/min)

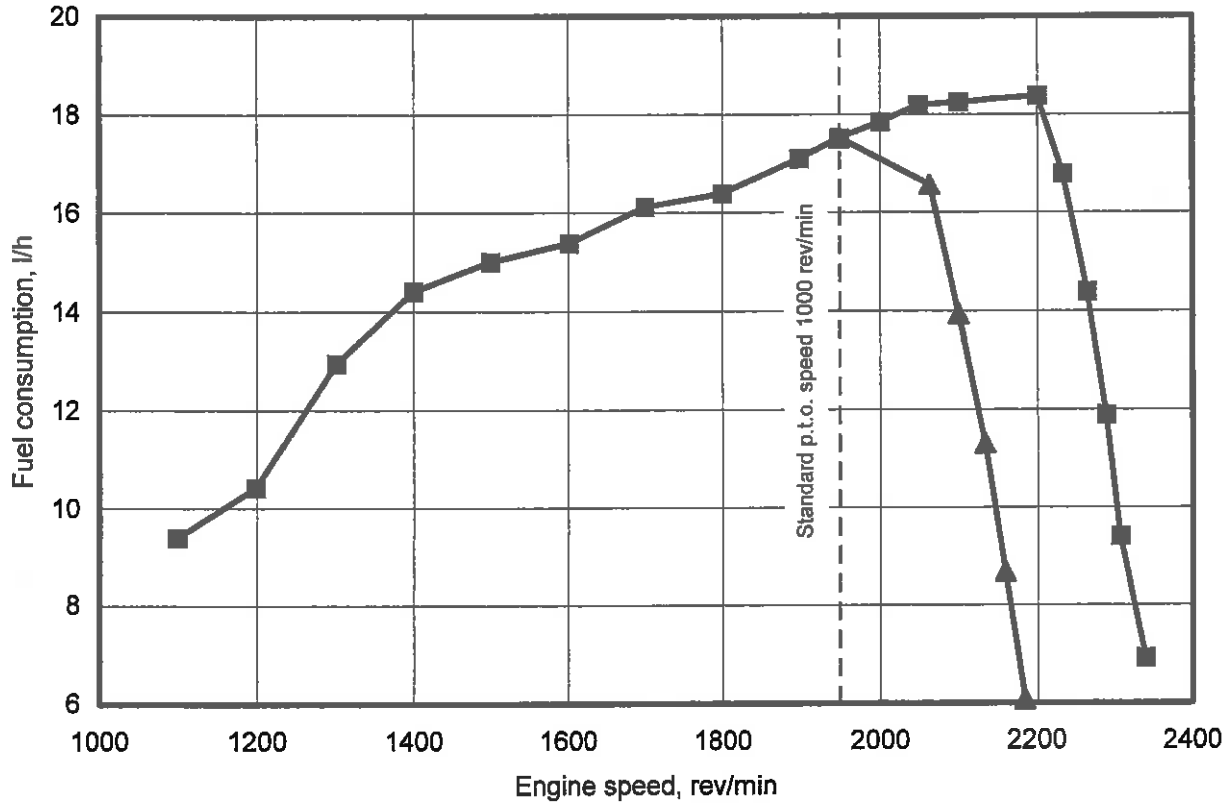
Mean atmospheric conditions:	
Temperature	23 °C
Pressure	97.3 kPa
Relative humidity	30 %
Maximum temperatures:	
Coolant	80 °C
Engine oil	103 °C
Fuel	43 °C
Engine air intake	31 °C

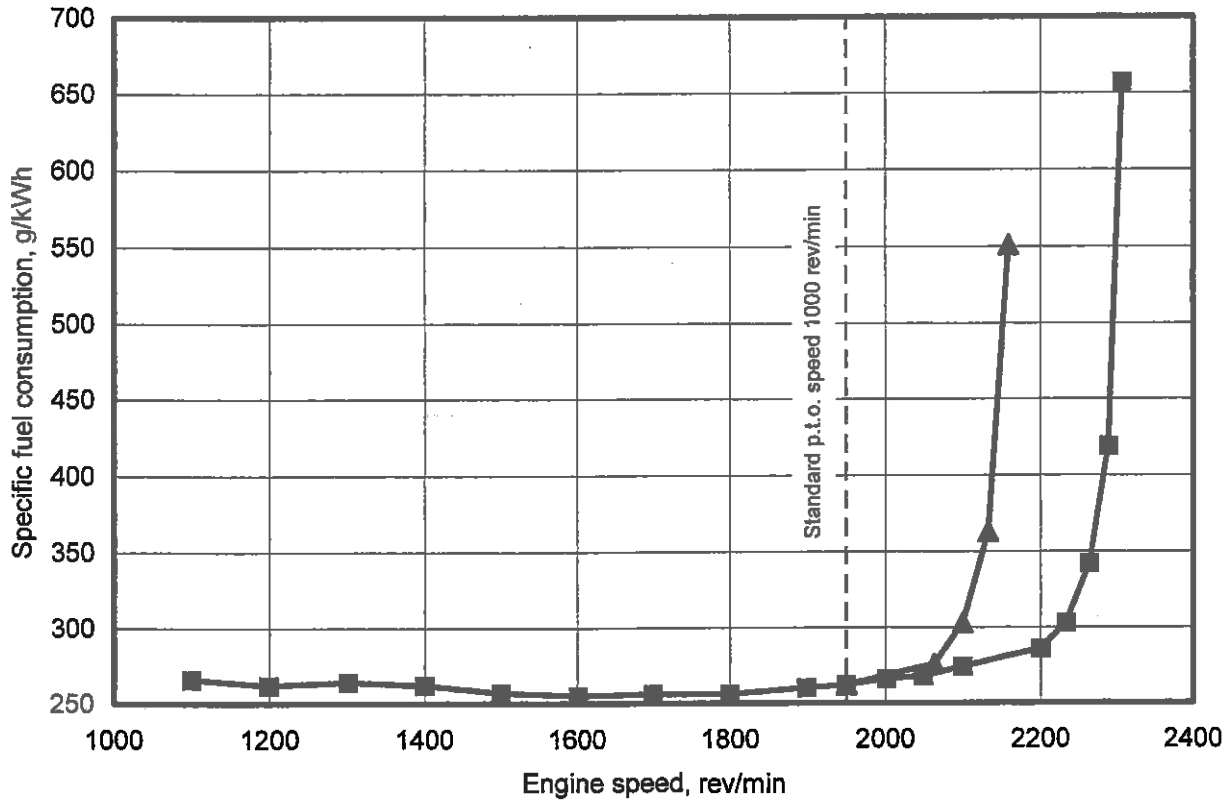
POWER TAKE-OFF TEST



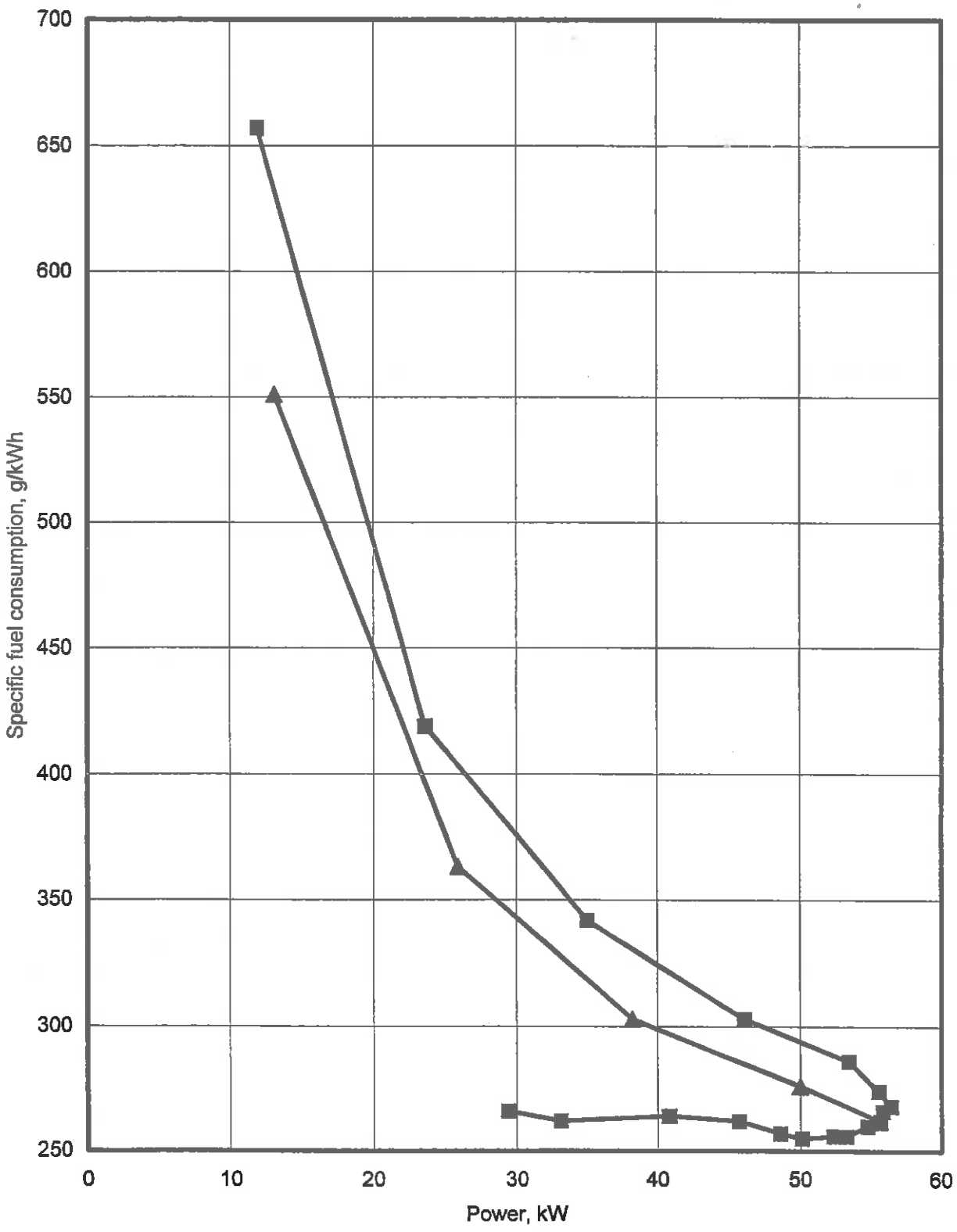


POWER TAKE-OFF TEST





POWER TAKE-OFF TEST



3.2 HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 24th April and 29th July 1998

3.2.1 Hydraulic power test

Sustained pressure with relief valve open: 18.8 MPa

Pump stalled: No

Pump delivery rate at minimum pressure: 57.0 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	44.0	16.9	12.4
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	50.0	16.4	13.7

Tapping point used for test: External tapping

Temperature of hydraulic fluid: 66 °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 14

	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	720 mm	896 mm
with lifting force	674 mm	811 mm
Maximum corrected force exerted through full range	47.5 kN	39.6 kN
Corresponding pressure of hydraulic fluid	16.9 MPa	16.9 MPa
Moment about rear-wheel axis	49.5 kNm	65.4 kNm
Maximum tilt angle of mast from vertical	-	11 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points													
mm	-405	-400	-350	-300	-200	-100	0	+100	+200	+300	+324	+400	+406
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	-	-	47.5	48.6	51.7	53.5	55.4	55.2	55.9	57.2	57.7	-	-
Corresponding pressure: 16.9 MPa													
Lifting forces at the test frame													
kN	43.7	43.7	-	45.2	45.2	45.3	45.2	44.1	42.6	41.3	-	39.9	39.6
Corresponding pressure: 16.9 MPa													

3.2.3 Front power lift test

Linkage setting for test – see page 14

	At the hitch point	On the frame
Height of lower hitch points above ground in down position	188 mm	188 mm
Vertical movement: without lifting force with lifting force	753 mm 726 mm	974 mm 865 mm
Maximum corrected force exerted through full range	14.4 kN	10.8 kN
Corresponding pressure of hydraulic fluid	16.9 MPa	16.9 MPa
Moment about rear-wheel axis	18.4 kNm	20.4 kNm
Maximum tilt angle of mast from vertical	-	17 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points													
mm	-306	-300	-258	-200	-100	0	+100	+200	+300	+400	+468	+500	+559
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	-	-	14.4	14.4	14.9	15.3	16.9	16.7	17.3	17.7	18.4	-	-
Corresponding pressure: 16.9 MPa													
Lifting forces at the test frame													
kN	13.1	13.1	-	13.0	13.1	13.0	13.0	12.8	12.4	11.9	-	11.2	10.8
Corresponding pressure: 16.9 MPa													

3.3 DRAWBAR POWER TEST (unballasted tractor)

Date of tests: 29th September 1998

Type of track: Bituminous-concrete surface

Height of drawbar above ground	Tyre inflation pressure	
	Front	Rear
mm	kPa	kPa
428	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)						
2 Lo M	31.2	40.5	2.77	2262	15.2	393
2 Lo H	35.5	40.3	3.17	2242	15.0	371
3 Lo L	41.7	40.2	3.73	2095	12.1	326
3 Lo M	43.0	34.5	4.49	2093	8.5	315
3 Lo H	44.3	29.9	5.33	2104	6.6	307
4 Lo L	44.6	28.0	5.73	2103	6.0	305
4 Lo M	44.7	24.0	6.71	2097	4.7	305
1 Hi L	45.2	22.6	7.20	2103	4.5	301
4 Lo H	44.1	20.2	7.86	2102	3.7	316
1 Hi M	43.8	18.8	8.38	2098	3.3	309
1 Hi H	43.6	16.1	9.76	2098	3.0	310
2 Hi L	43.7	14.9	10.55	2102	2.6	309
2 Hi M	43.6	13.0	12.06	2092	2.2	306
2 Hi H	43.5	11.0	14.24	2102	1.8	311
3.3.2 FUEL CONSUMPTION 3.3.2.1 in selected gear, at maximum power at rated speed						
1 Hi L	42.3	20.0	7.62	2202	3.4	316
3.3.2.1.1 75 % of pull at maximum power at rated speed						
1 Hi L	32.9	15.0	7.90	2266	2.7	360
3.3.2.1.2 50 % of pull at maximum power at rated speed						
1 Hi L	22.5	10.0	8.09	2297	1.6	446
3.3.2.1.3 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.1						
4 Lo H	33.0	15.0	7.91	2097	2.7	337
3.3.2.1.4 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.2						
4 Lo H	22.5	10.0	8.09	2122	1.6	406
3.3.2.2 in selected gear nearest to 7.5 km/h at rated speed						
1 Hi L	42.3	20.0	7.62	2202	3.4	316
3.3.2.2.1 75 % of pull at maximum power at rated speed						
1 Hi L	32.9	15.0	7.90	2266	2.7	360
3.3.2.2.2 50 % of pull at maximum power at rated speed						
1 Hi L	22.5	10.0	8.09	2297	1.6	446
3.3.2.2.3 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.1						
4 Lo H	33.0	15.0	7.91	2097	2.7	337
3.3.2.2.4 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.2.2						
4 Lo H	22.5	10.0	8.09	2122	1.6	406

Specific energy	Temperature			Atmospheric conditions		
	Fuel	Coolant	Engine oil	Temperature	Relative humidity	Pressure
kWh/l	°C	°C	°C	°C	%	kPa
2.14	53	84	100	13	95	96.6
2.26	56	83	100	14	90	96.6
2.58	55	86	104	15	86	96.6
2.67	55	86	104	16	80	96.6
2.73	55	84	103	16	77	96.6
2.76	56	86	103	17	76	96.6
2.75	58	86	103	17	74	96.6
2.79	56	87	103	17	76	96.6
2.66	41	88	87	17	73	96.6
2.72	54	87	102	17	71	96.6
2.71	56	87	103	17	72	96.6
2.71	57	87	103	17	72	96.6
2.75	56	87	102	17	75	96.6
2.70	56	87	102	16	77	96.6
2.66	57	87	101	17	76	96.6
2.33	56	88	101	17	78	96.6
1.88	56	88	100	17	78	96.6
2.50	56	87	101	17	76	96.6
2.07	55	87	101	17	76	96.6
2.66	57	87	101	17	76	96.6
2.33	56	88	101	17	78	96.6
1.88	56	88	100	17	78	96.6
2.50	56	87	101	17	76	96.6
2.07	55	87	101	17	76	96.6

4. OPTIONAL TESTS RESULTS

4.1 BRAKING

Date of tests: 19th and 20th August 1998

Tractor mass (with driver)

	Front	Rear	Total
	kg	kg	kg
Ballasted tractor	2350	5150	7500
Unballasted tractor	1870	2595	4465

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	36.0	0.095	0.85	58.82
		0.195	1.88	26.60
		0.265	2.73	18.32
		0.380	4.10	12.20
		0.480	4.32	11.57
		0.525	4.94	10.12
Unballasted tractor	36.4	0.100	1.21	42.25
		0.145	2.27	22.52
		0.185	2.98	17.15
		0.250	3.62	14.12
		0.300	4.17	12.26

Maximum deviation of tractor from its original course: Not significant

Abnormal vibration: None

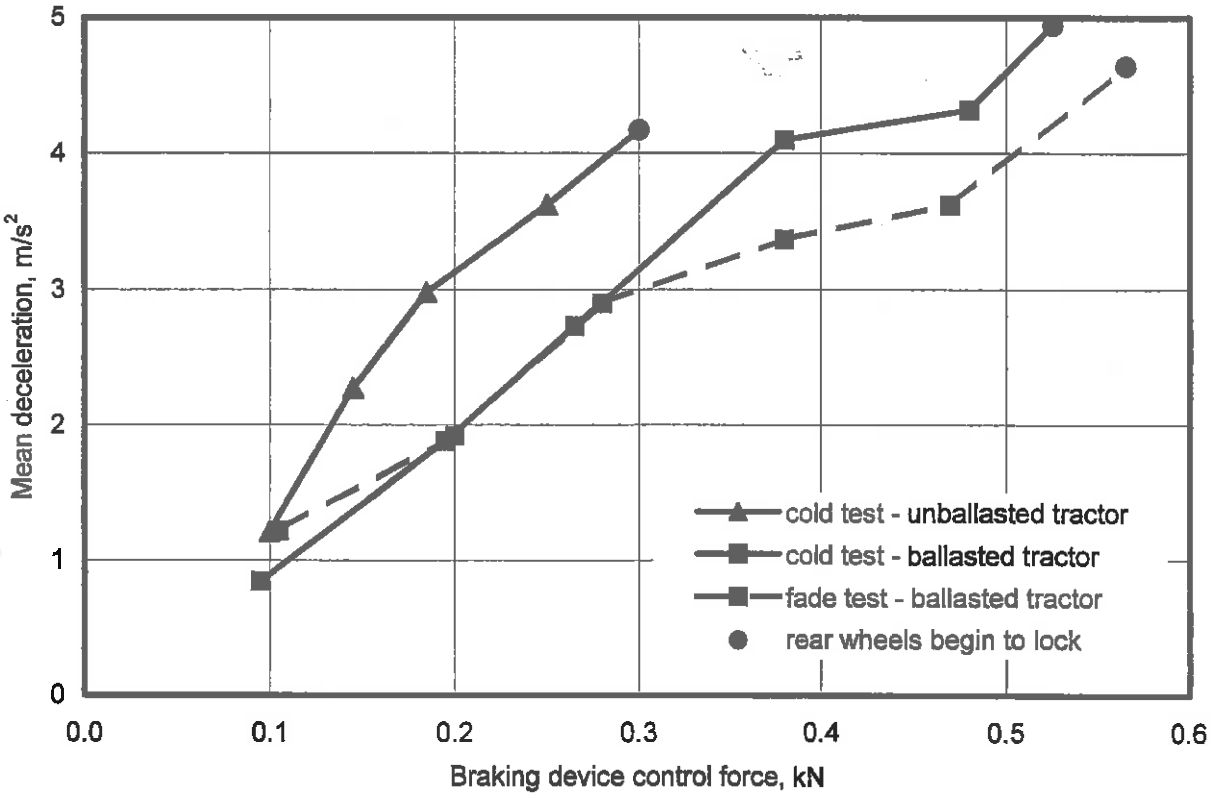
4.1.2 Fade test

	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	36.0	0.105	1.22	40.98
		0.200	1.92	26.04
		0.280	2.90	17.24
		0.380	3.37	14.84
		0.470	3.62	13.81
		0.565	4.64	10.78

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	0.170	0.170

4.2 MEASUREMENT OF EXTERNAL NOISE

Date of tests: 9th july 1998

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: 27.7 km/h

Sound level: 86.5 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: 27.7 km/h

Sound level: 85.5 dB(A)

5. SUPPLEMENTARY TESTS RESULTS

5.1 MAIN POWER TAKE-OFF (modified tractor)

Date and location of tests: 6th May 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
5.1.1 MAXIMUM POWER – TWO-HOUR TEST						
56.7	2024	1038	14.90	17.84	263	3.18
5.1.2 POWER AT RATED ENGINE SPEED						
54.3	2200	1128	15.21	18.22	280	2.98
5.1.3 STANDARD POWER TAKE-OFF SPEED [1000±25 rev/min]						
56.6	1950	1000	14.44	17.29	255	3.27
5.1.4 PART LOADS 5.1.4.1 the torque corresponding to maximum power at rated engine speed						
54.3	2200	1128	15.21	18.22	280	2.98
5.1.4.2 85 % of torque obtained in 3.1.4.1						
47.2	2248	1153	14.09	16.87	299	2.80
5.1.4.3 75 % of torque defined in 3.1.4.2						
35.9	2283	1171	12.13	14.53	338	2.47
5.1.4.4 50 % of torque defined in 3.1.4.2						
24.2	2309	1184	9.93	11.89	410	2.04
5.1.4.5 25 % of torque defined in 3.1.4.2						
12.2	2324	1192	7.82	9.37	641	1.30
5.1.4.6 unloaded						
-	2352	1206	5.66	6.78	-	-

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
5.1.5 PART LOADS AT STANDARD POWER TAKE-OFF SPEED [1000±25 rev/min] 5.1.5.1 the torque corresponding to maximum power						
56.6	1950	1000	14.44	17.29	255	3.27
5.1.5.2 85 % of torque obtained in 3.1.5.1						
50.5	2048	1050	13.61	16.30	270	3.10
5.1.5.3 75 % of torque defined in 3.1.5.2						
38.8	2094	1074	11.51	13.78	297	2.82
5.1.5.4 50 % of torque defined in 3.1.5.2						
26.3	2129	1092	9.26	11.09	352	2.37
5.1.5.5 25 % of torque defined in 3.1.5.2						
13.3	2157	1106	7.05	8.44	530	1.58
5.1.5.6 unloaded						
-	2194	1125	4.82	5.77	-	-

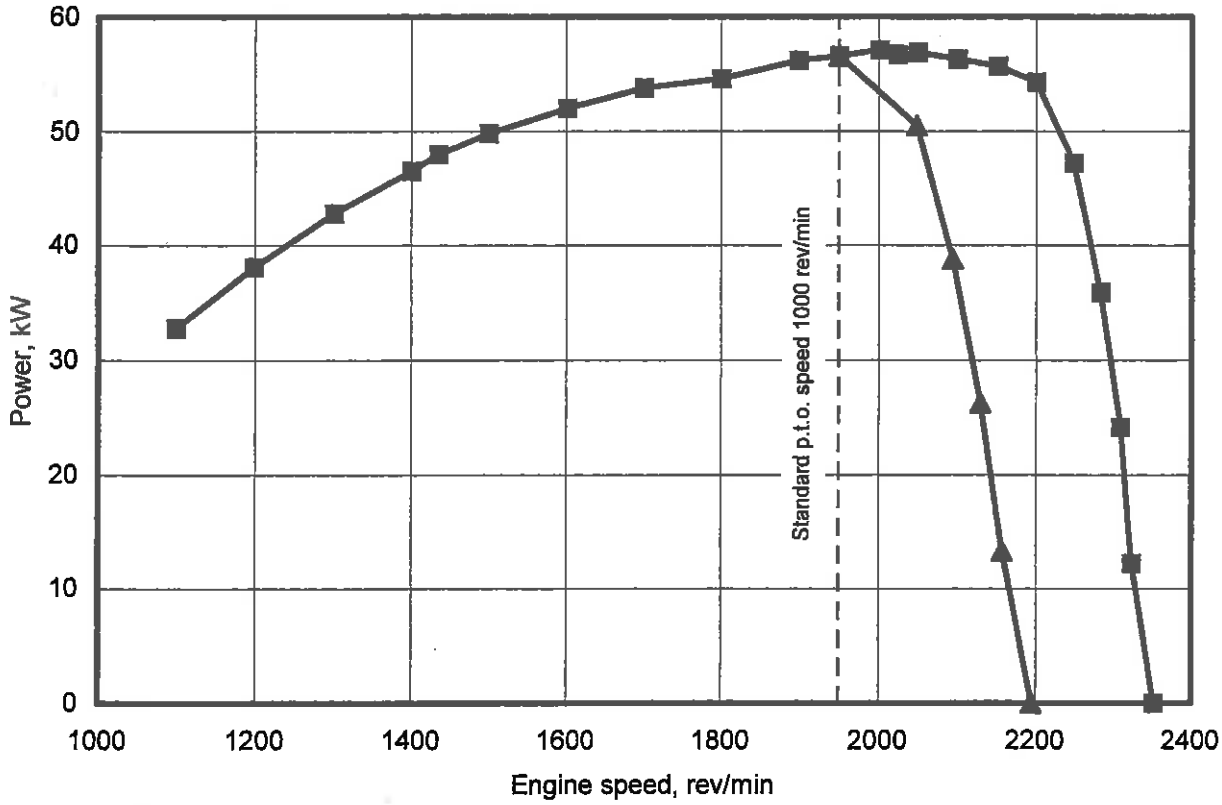
No load maximum engine speed: 2352 rev/min

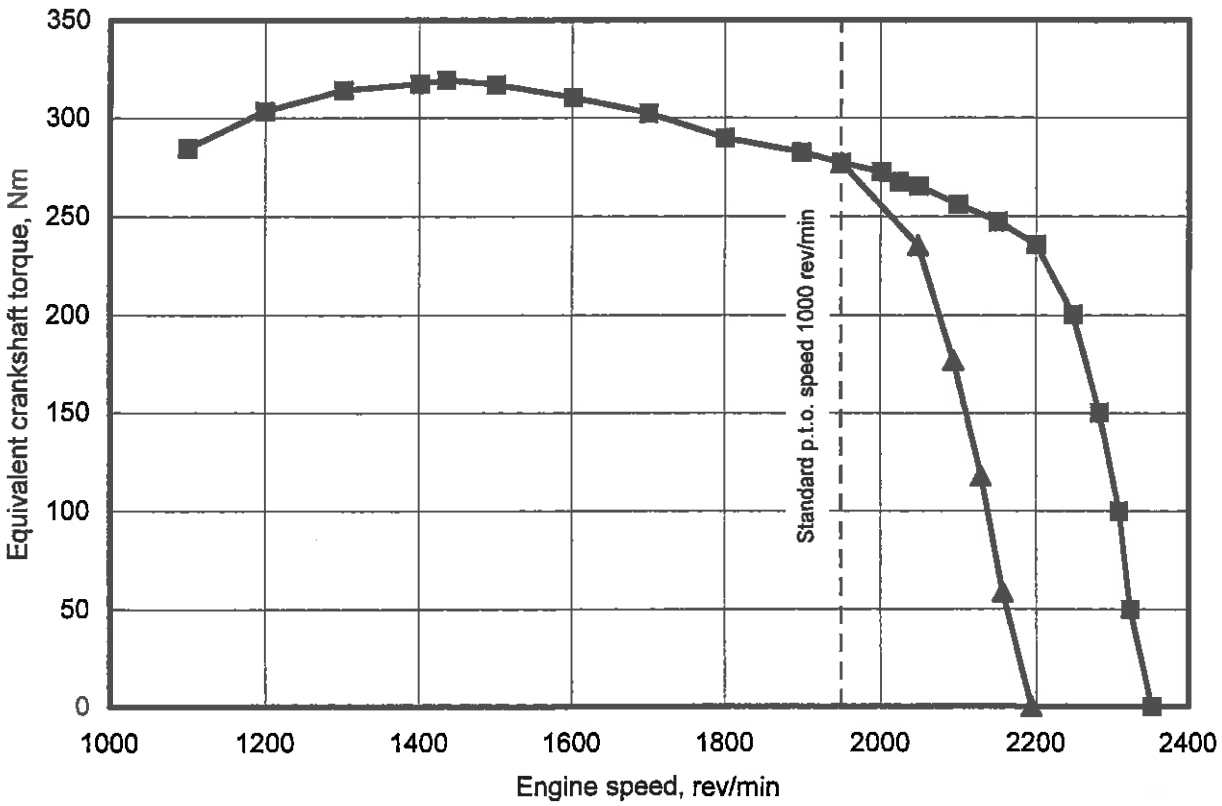
Torque (equivalent crankshaft)
At maximum power: 267.5 Nm
At rated engine speed: 235.7 Nm
At standard power take-off speed: 277.2 Nm

Maximum torque (equivalent crankshaft): 319.4 Nm
(engine speed: 1435 rev/min)

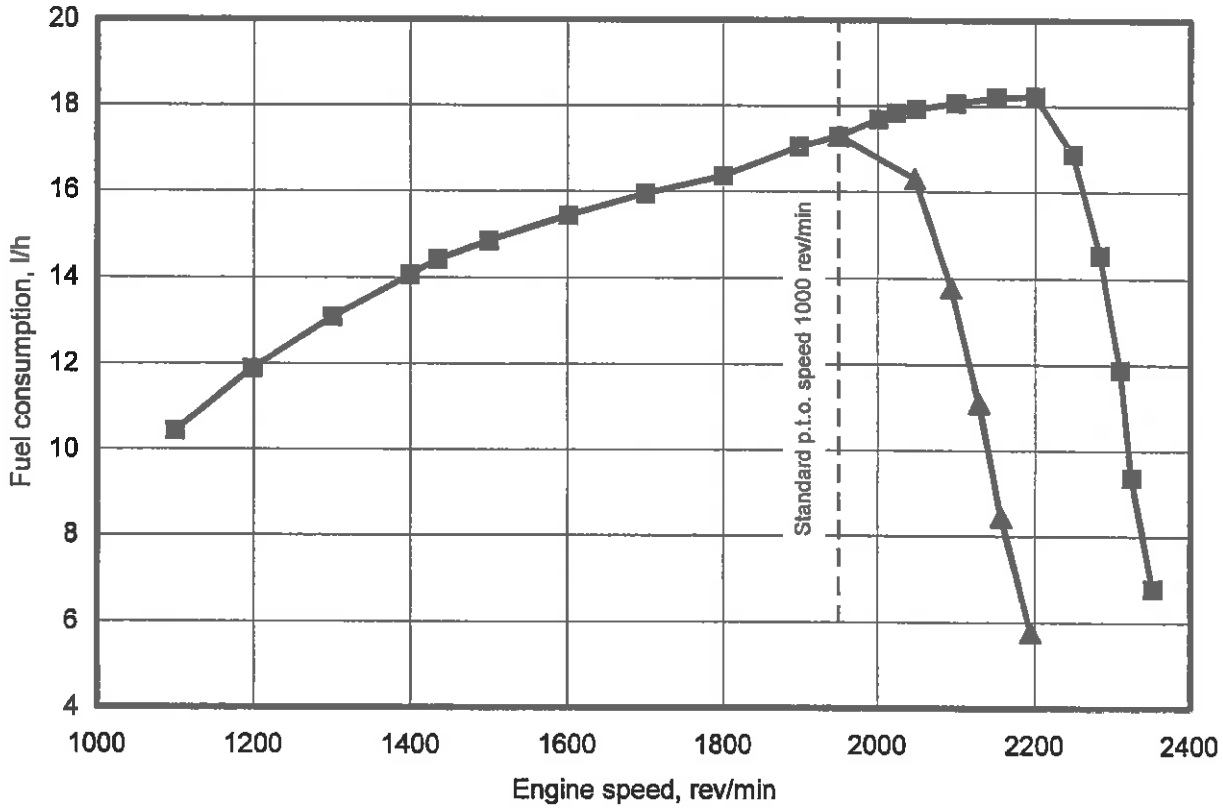
Mean atmospheric conditions:	
Temperature	23 °C
Pressure	97.2 kPa
Relative humidity	45 %
Maximum temperatures:	
Coolant	84 °C
Engine oil	108 °C
Fuel	40 °C
Engine air intake	27 °C

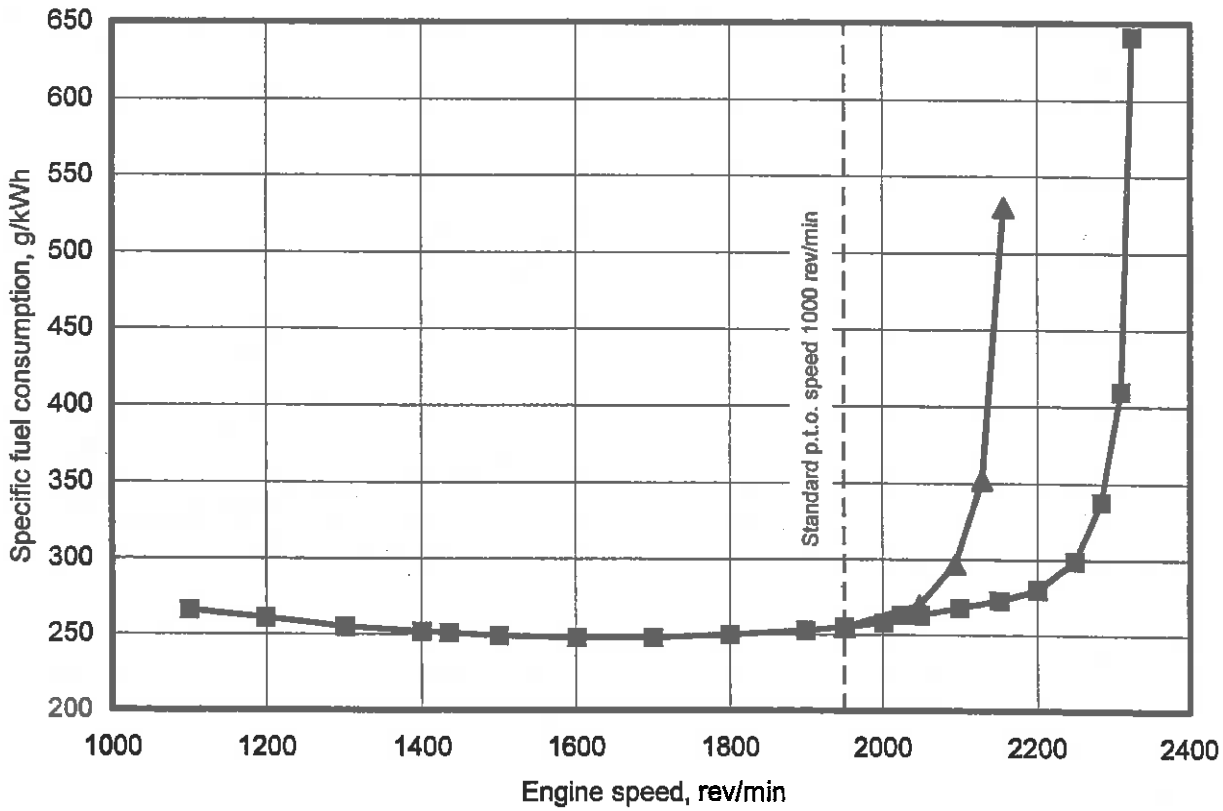
POWER TAKE-OFF TEST



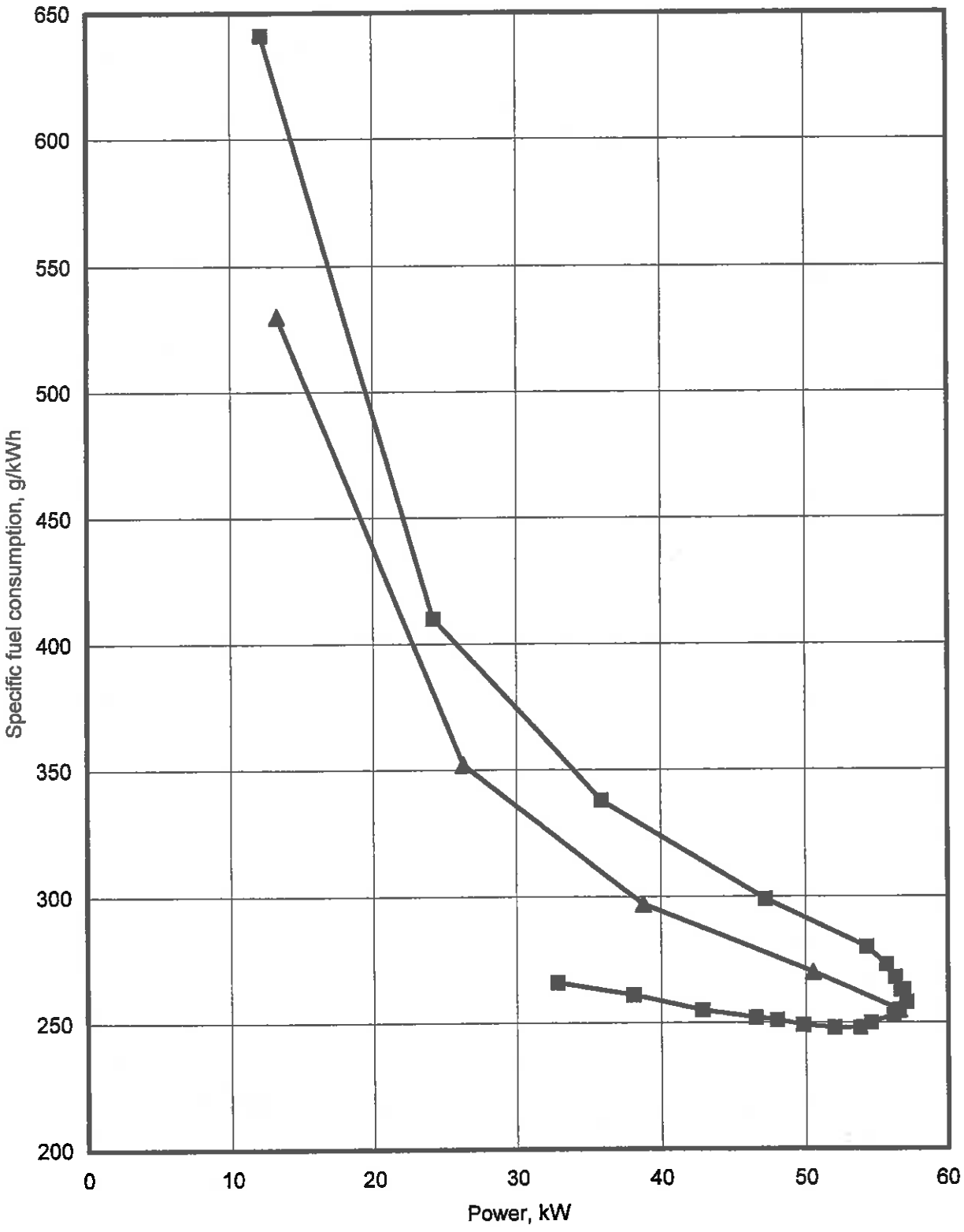


POWER TAKE-OFF TEST





POWER TAKE-OFF TEST



5.2 MEASUREMENT OF EXTERNAL NOISE (modified tractor)

Date of tests:	9th May 2002
Make and model of sound level meter:	BRÜEL & KJÆR, 2231
Type of track:	Bituminous-concrete surface

5.2.1 According to OECD standard code 1

Gear number:	4 Hi H
Travelling speed before acceleration:	30.5 km/h
Sound level:	84.0 dB(A)

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

Gear number:	4 Hi H
Travelling speed before acceleration:	30.5 km/h
Sound level:	83.0 dB(A)

6. REPAIRS

None

7. REMARKS

None

Extensions granted by:	Dipl. Ing. Peter Pernis
Signed:	
Date:	21st May 2002

Head of the Tractor Laboratory

Peter Pernis

Dipl. Ing. Peter Pernis

STÁTNÍ ZKUŠEBNA ZEMĚDĚLSKÝCH, POTRAVINÁŘSKÝCH A LESNÍCKÝCH STROJŮ
SZZPLS
zkušební laboratoř
1

Director

Dipl. Ing. Josef Šenk, CSc.