STÁTNÍ ZKUŠEBNA ZEMĚDĚLSKÝCH, POTRAVINÁŘSKÝCH A LESNICKÝCH STROJŮ

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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 Nº 2/2012 Date of approval: 24th October 2002

Agricultural Tractor

ZETOR 11441 Forterra (4WD) 40 km/h version

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

Report Nº 22456

Date of test: January - August 2002

TABLE OF CONTENTS

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:	122 hours
Location of test:	SZZPLS Praha, Czech Republic

1. SPECIFICATIONS OF TRACTOR

1.1 IDENTIFICATION

Make of the tractor:	ZETOR
Model (trade name):	11441 Forterra
Type:	4WD

1.1.1 Numbers

1st Serial № or prototype:	T1144101001A
Serial №:	T1144101001B

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:	1403
Type:	4-stroke diesel engine, direct injection, water cooled, turbocharged with intercooler
Serial №:	*1403-001001*

1.2.1 Cylinders

Number/disposition:	4, in-line, vertical
Bore/stroke:	105 mm/120 mm
Capacity:	4156 cm³
Compression ratio:	17.0±0.6:1
Arrangement of valves:	Overhead
Cylinder liners:	Wet, replaceable

1.2.2 Supercharging

Make, model and type:	ČZ, C14 63, exhaust driven with pressure corrector and intercooler
Pressure:	155 kPa
Intercooler:	Charge air heat exchanger with engine coolant cooled in additional radiator

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 3461, in-line
Serial №:	BG 0018
Manufacturer's production setting of injection pump	
Flow rate (rated engine speed and full load):	$23.58^{+0.48}$ dm^3/h
Timing:	14°+1° before TDC
Make, model and type of injectors:	MOTORPAL, VA 76S 160 3013 (DOP 150S 428-4104), 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:	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 cooled in additional radiator

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:	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:	165 Ah at 20 hours

1.2.10 Exhaust system

Make, model and type:	ZETOR, 15.000.0114, 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 2200 rev/min km/h (*)
Forward				
1	Lo	L	331.969	2.05
		M	286.768	2.37
		H	248.023	2.74
2		L	215.041	3.16
		M	185.760	3.66
		H	160.663	4.23
3		L	141.961	4.79
		M	122.631	5.55
		H	106.063	6.41
4		L	99.166	6.86
		M	85.663	7.94
		H	74.089	9.18
1	Hi	L	80.293	8.47
		M	69.360	9.81
		H	59.989	11.34
2		L	52.012	13.08
		M	44.930	15.14
		H	38.859	17.50
3		L	34.336	19.81
		M	29.661	22.93
		H	25.653	26.51
4		L	23.985	28.35
		M	20.719	32.82
		H	17.920	37.95
(*) Calculated with a tyre dynamic radius index of 820 mm				

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	287.109	2.37
		M	248.015	2.74
		H	214.506	3.17
2		L	185.981	3.66
		M	160.658	4.23
		H	138.952	4.89
3		L	122.777	5.54
		M	106.059	6.41
		H	91.730	7.41
1	Hi	L	69.443	9.79
		M	59.987	11.34
		H	51.883	13.11
2		L	44.983	15.12
		M	38.858	17.50
		H	33.608	20.24
3		L	29.696	22.90
		M	25.653	26.51
		H	22.187	30.65
(*) Calculated with a tyre dynamic radius index of 820 mm				

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: 1.4481

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
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	0.217	23.7863
	Hi	0.896	5.7532
1000	Lo	0.119	43.2188
	Hi	0.493	**10.4533**

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

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
	1127	2200		
1000 (CCW)	1000	1955	1.9545	
	1126	2200		

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

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): $18.8^{+1.3}$ 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, 2 double acting control valves, 4 pressure and 1 return couplings at rear of tractor

Maximum volume of oil available to external cylinders: 12 dm³ or 27 dm³ with overfill

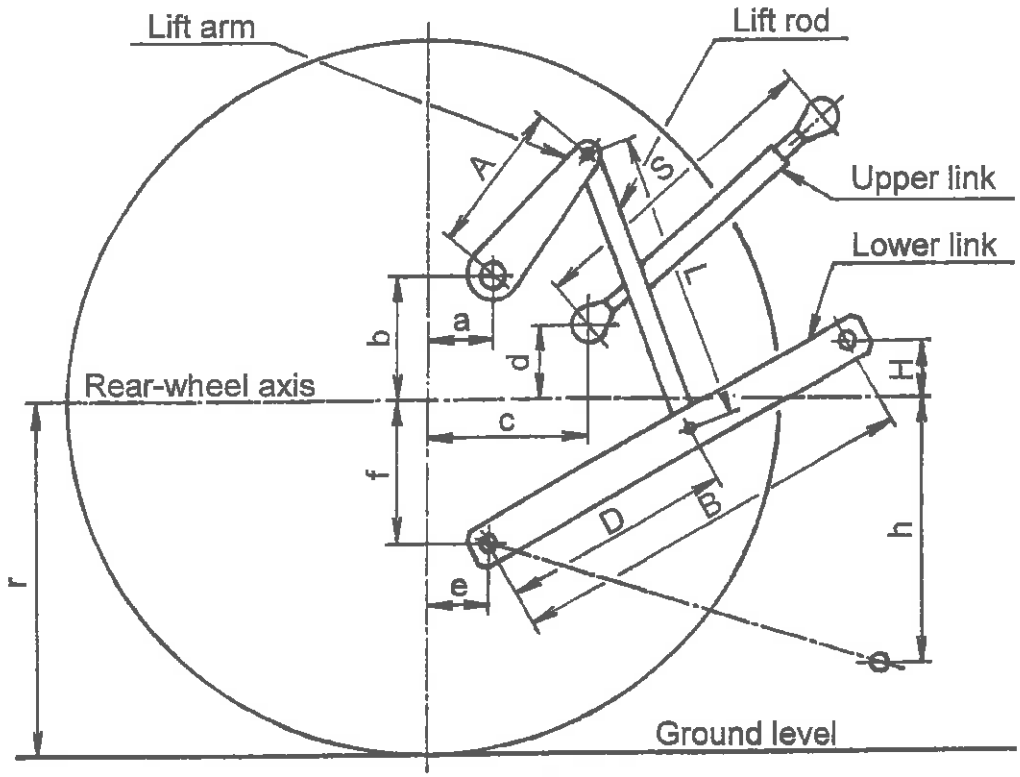
1.5.2 Front power lift

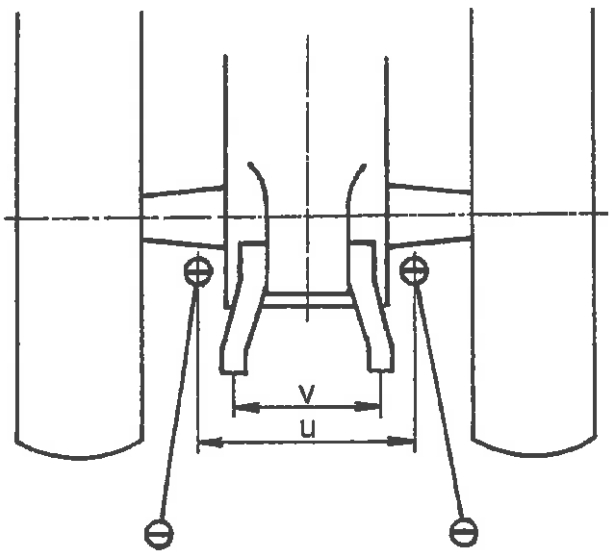
Make, model and type:	ZETOR, 17.448.000, hydraulic
Type of hydraulic system:	Open centre
Type and number of cylinders:	2 external double-acting
Type of linkage lock for transport:	Pin lock
Relief valve pressure setting (tolerance):	$18.8^{+1.3}$ MPa
Opening pressure of cylinder safety valve:	Safety valve 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





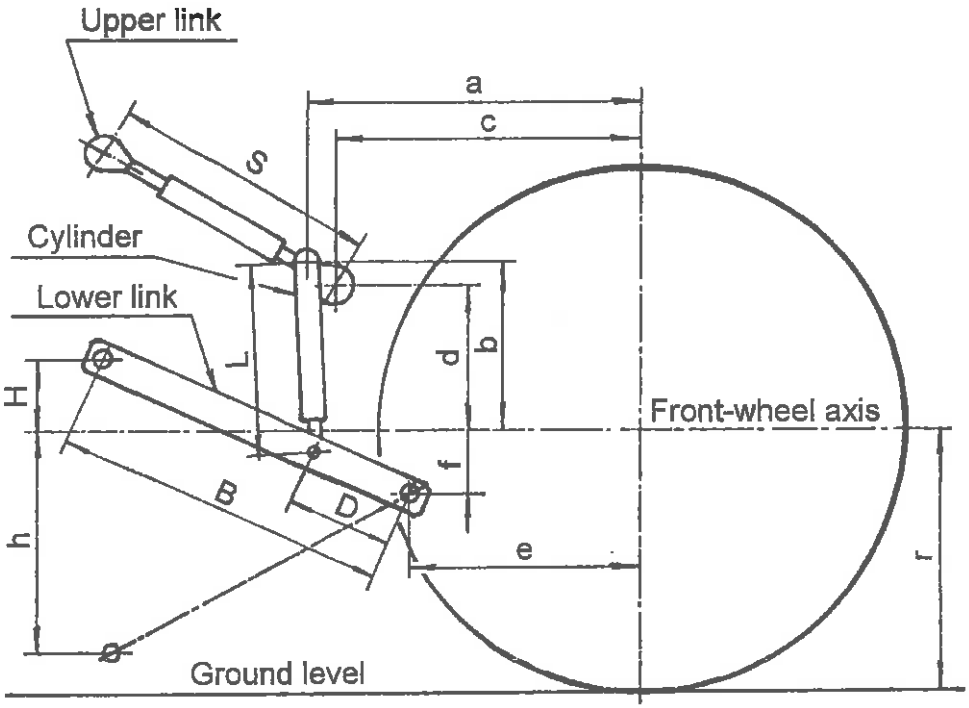
Linkage geometry dimensions:

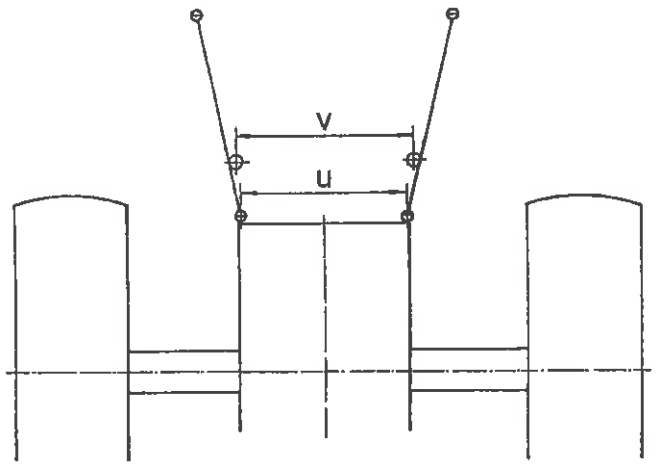
			Dimension or range	Settings used in test
			mm	mm
Length of lift arms		(A)	330	330
Length of lower links		(B)	892	892
Distance of lift arm pivot point from rear-wheel axis:	horizontally	(a)	150	150
	vertically	(b)	275	275
Horizontal distance between the 2 lower link points		(u)	510	510
Horizontal distance between the 2 lift arm end points		(v)	590	590
Length of upper link		(S)	645 to 875	709
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)	585 to 715	665
Height of lower hitch points relative to the rear-wheel axis:				
	in low position	(h)	475 to 745	620
	in high position	(H)	-65 to 205	62
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

1.6.2 Front three-point linkage

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)	747	-
Distance of lift arm pivot point from front-wheel axis: horizontally	(a)	734	-
vertically	(b)	357	
Horizontal distance between the 2 lower link points	(u)	428	-
Horizontal distance between the 2 lift arm end points	(v)	428	-
Length of upper link	(S)	540 to 700	-
Distance of upper link pivot point from front-wheel axis: horizontally	(c)	655	-
vertically	(d)	337	
Distance of lower link pivot point from front-wheel axis: horizontally	(e)	566	-
vertically	(f)	141	-
Distance of lower link pivot points to lift rod pivot points on lower links	(D)	259	-
Length of lift rods	(L)	365 to 615	-
Height of lower hitch points relative to the front-wheel axis:			
in low position	(h)	467	-
in high position	(H)	254	-
Height above ground of lower hitch points when locked in transport position (*)		844	-
(*) Assuming r=590 mm tyre dynamic radius index			

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 (on request available, not fitted to tested tractor)

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:	882 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:	896 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:	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 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
4860	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	2140	2155
Rear	2625	2685
Total	4765	4840

2.4 TYRES AND TRACK WIDTH SPECIFICATIONS

	Front	Rear
Tyres:		
Make	TAURUS	TAURUS
Model	Point 7	Point 7
Dimensions	420/70 R 24	520/70 R 38
Ply rating	130 A8 (127 B)	150 A8 (147 B)
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:	0.835 g/cm³ for p.t.o. tests 0.839 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: 30th January 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						
74.2	1968	1009	18.77	22.48	253	3.30
3.1.2 POWER AT RATED ENGINE SPEED						
70.4	2200	1128	19.24	23.04	273	3.06
3.1.3 STANDARD POWER TAKE-OFF SPEED [1000±25 rev/min]						
73.6	1950	1000	18.55	22.22	252	3.31
3.1.4 PART LOADS 3.1.4.1 the torque corresponding to maximum power at rated engine speed						
70.4	2200	1128	19.24	23.04	273	3.06
3.1.4.2 85 % of torque obtained in 3.1.4.1						
61.3	2252	1155	17.57	21.04	287	2.91
3.1.4.3 75 % of torque defined in 3.1.4.2						
46.7	2289	1174	14.81	17.74	317	2.63
3.1.4.4 50 % of torque defined in 3.1.4.2						
31.6	2326	1193	12.30	14.73	389	2.15
3.1.4.5 25 % of torque defined in 3.1.4.2						
16.1	2361	1211	9.72	11.64	604	1.38
3.1.4.6 unloaded						
-	2387	1224	7.07	8.47	-	-

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						
73.6	1950	1000	18.55	22.22	252	3.31
3.1.5.2 85 % of torque obtained in 3.1.5.1						
64.9	2024	1038	16.75	20.06	258	3.24
3.1.5.3 75 % of torque defined in 3.1.5.2						
49.8	2073	1063	13.86	16.60	278	3.00
3.1.5.4 50 % of torque defined in 3.1.5.2						
34.0	2124	1089	11.24	13.46	331	2.53
3.1.5.5 25 % of torque defined in 3.1.5.2						
17.4	2168	1112	8.49	10.17	488	1.71
3.1.5.6 unloaded						
-	2205	1131	5.66	6.78	-	-

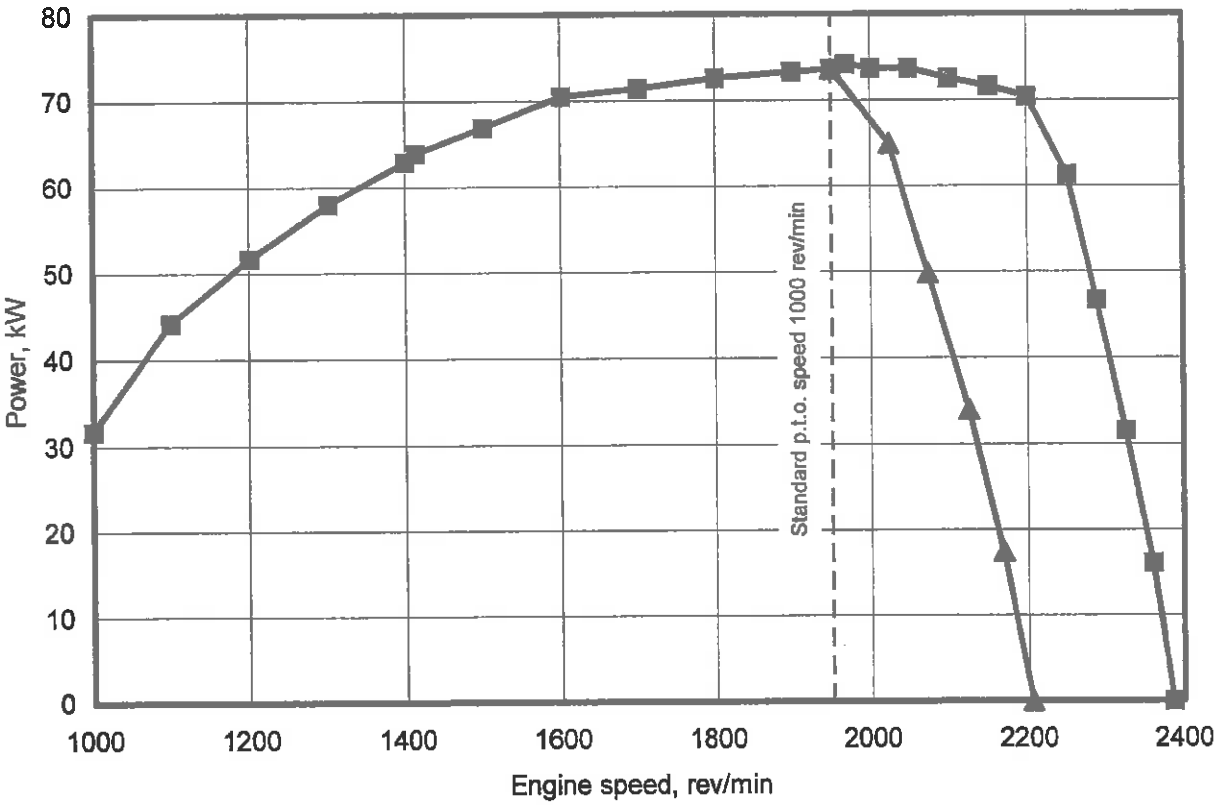
No load maximum engine speed: 2387 rev/min

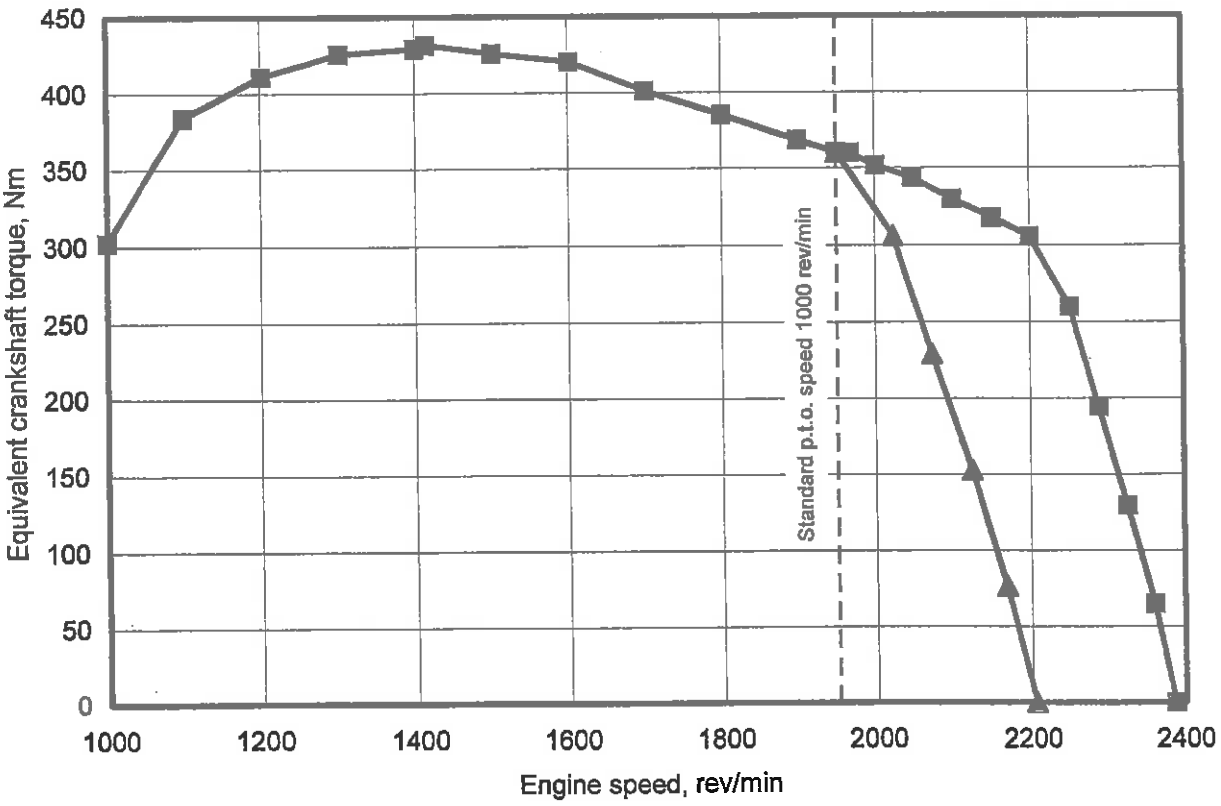
Torque (equivalent crankshaft)
At maximum power: 360.0 Nm
At rated engine speed: 305.6 Nm
At standard power take-off speed: 360.4 Nm

Maximum torque (equivalent crankshaft): 431.5 Nm
(engine speed: 1414 rev/min)

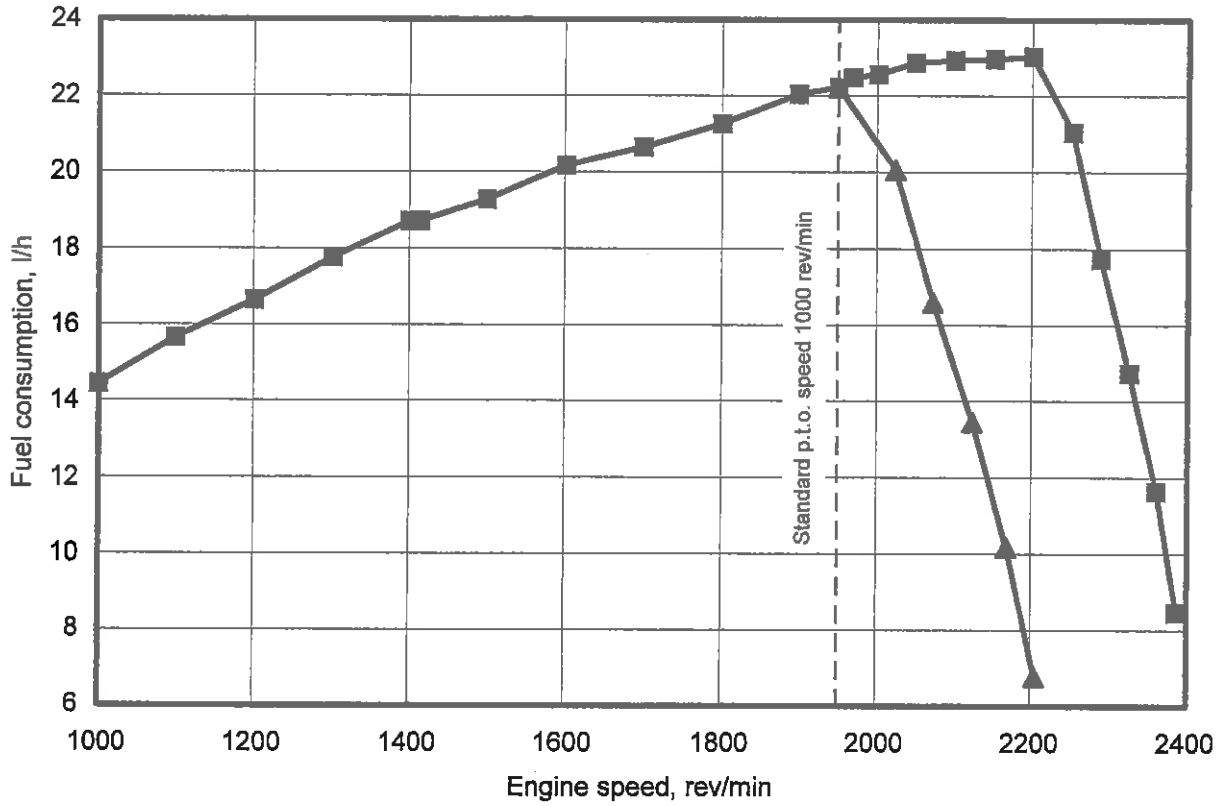
Mean atmospheric conditions:	
Temperature	20 °C
Pressure	97.6 kPa
Relative humidity	40 %
Maximum temperatures:	
Coolant	94 °C
Engine oil	113 °C
Fuel	40 °C
Engine air intake	27 °C

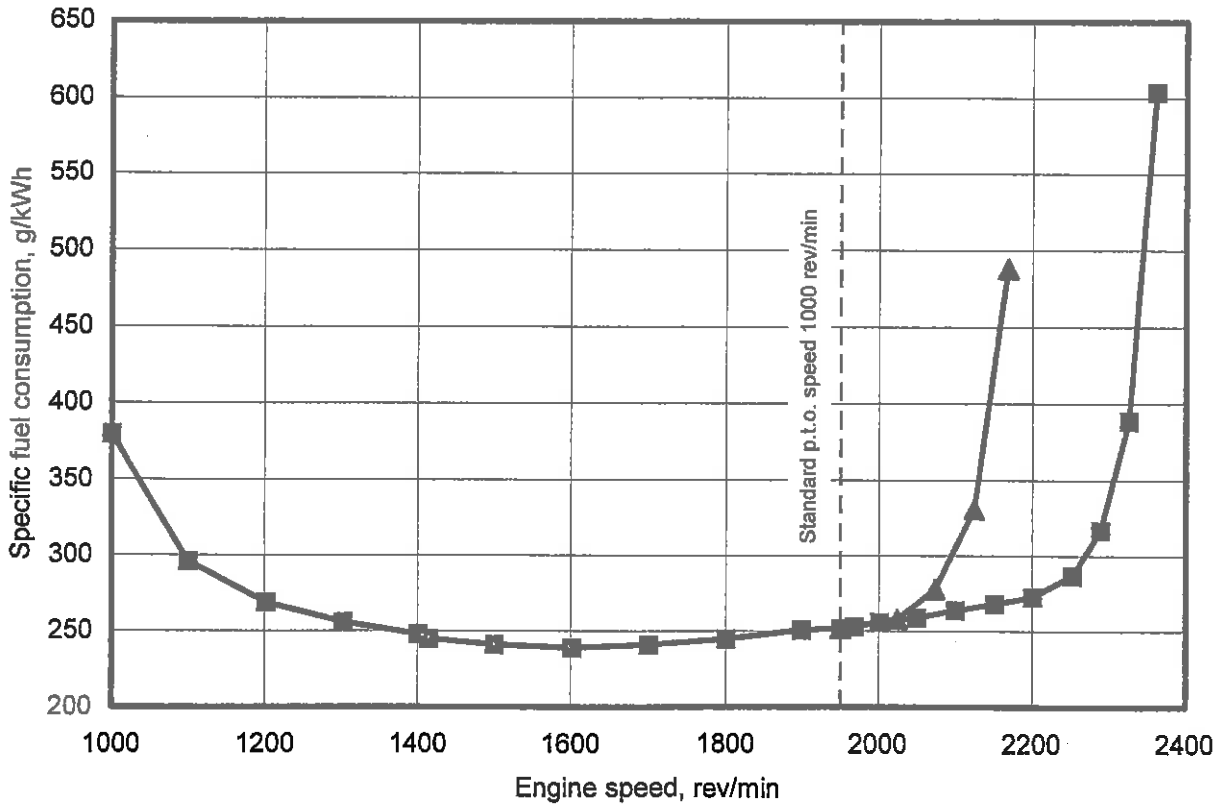
POWER TAKE-OFF TEST



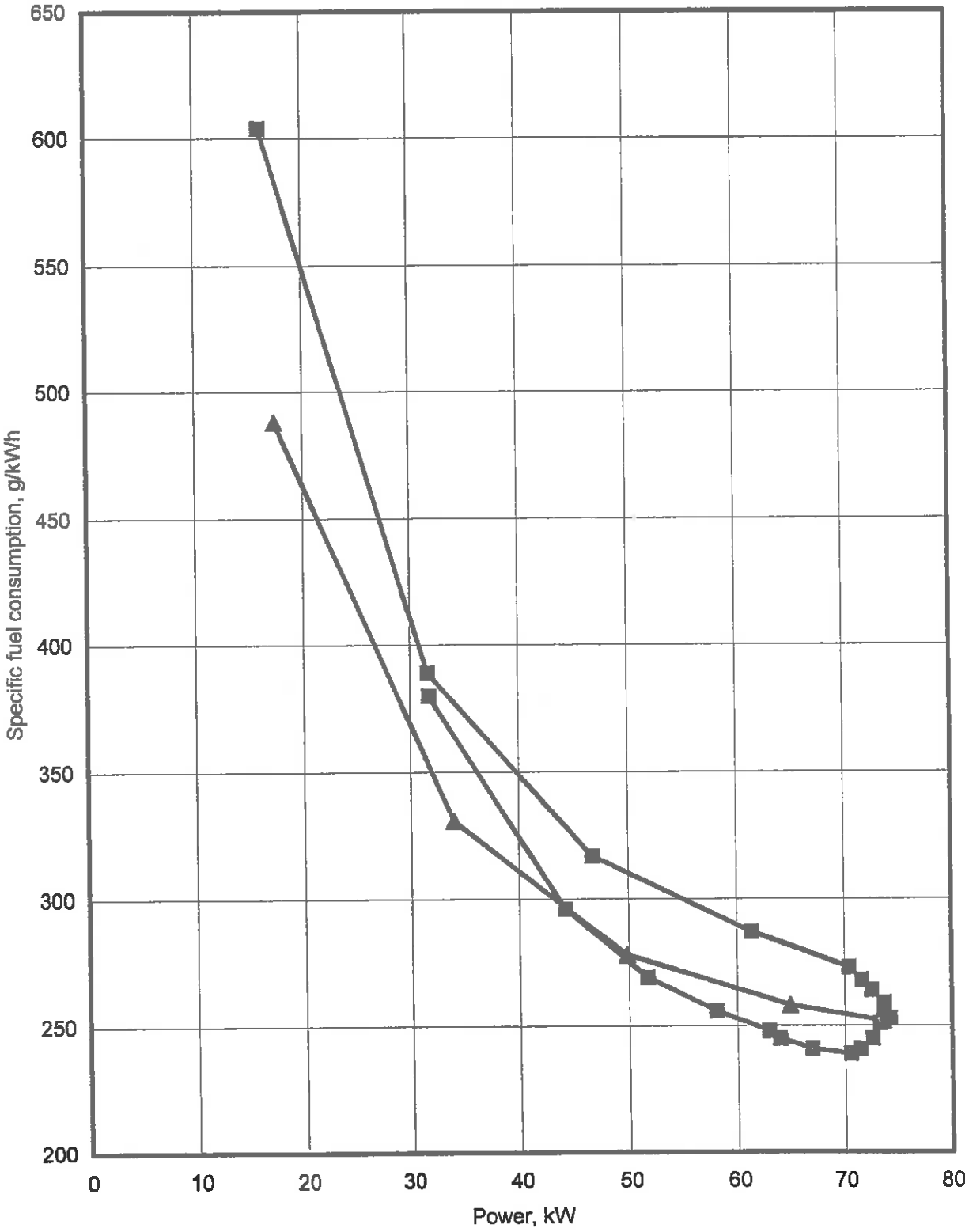


POWER TAKE-OFF TEST





POWER TAKE-OFF TEST



3.2 HYDRAULIC POWER AND LIFTING FORCE

Date of tests: 29th and 30th August 2002

3.2.1 Hydraulic power test

Sustained pressure with relief valve open: 19.7 MPa

Pump stalled: No

Pump delivery rate at minimum pressure: 67.5 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	24.2	17.7	7.1
Flow rate and hydraulic pressure corresponding to maximum hydraulic power	60.0	16.2	16.2

Tapping point used for test: External tapping

Temperature of hydraulic fluid: 64 °C

Opening pressure of the unloading valve: Not applicable

Closing pressures of the unloading valve: Not applicable

3.2.2 Power lift test

Linkage setting for test – see page 13

	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	682 mm	885 mm
with lifting force	632 mm	828 mm
Maximum corrected force exerted through full range	49.8 kN	40.0 kN
Corresponding pressure of hydraulic fluid	17.7 MPa	17.7 MPa
Moment about rear-wheel axis	51.9 kNm	66.1 kNm
Maximum tilt angle of mast from vertical	-	9 degrees

Lifting heights relative to the horizontal plane including the lower link pivot points												
mm	-514	-500	-400	-375	-300	-200	-100	0	+100	+200	+257	+314
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	-	-	-	49.8	53.1	55.1	57.0	57.7	58.6	59.5	60.2	-
Corresponding pressure: 17.7 MPa												
Lifting forces at the test frame												
kN	41.4	42.5	44.0	-	44.4	44.2	44.2	43.2	42.9	41.3	-	40.0
Corresponding pressure: 17.7 MPa												

3.3 DRAWBAR POWER TEST (unballasted tractor)

Date of tests: 27th August 2002

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 H	45.0	43.3	3.74	2251	15.6	386
3 Lo L	50.6	43.4	4.20	2235	15.6	375
3 Lo M	56.8	40.6	5.04	2168	9.7	339
3 Lo H	59.8	40.1	5.37	1973	8.6	311
4 Lo L	60.7	37.8	5.78	1974	7.8	303
4 Lo M	61.4	32.3	6.84	1972	6.0	301
1 Hi L	62.0	30.6	7.29	1963	5.6	296
4 Lo H	62.0	27.9	8.00	1976	5.1	298
1 Hi M	62.2	26.2	8.55	1971	4.8	296
1 Hi H	62.4	22.7	9.90	1953	3.8	293
2 Hi L	62.7	19.3	11.69	1988	3.2	295
2 Hi M	60.6	16.1	13.56	1982	2.8	304
3.3.2 FUEL CONSUMPTION 3.3.2.1 in selected gear, at maximum power at rated speed						
2 Hi L	59.5	16.5	12.99	2197	2.7	320
3.3.2.1.1 75 % of pull at maximum power at rated speed						
2 Hi L	46.8	12.5	13.48	2265	2.1	356
3.3.2.1.2 50 % of pull at maximum power at rated speed						
2 Hi L	31.8	8.3	13.78	2302	1.4	432
3.3.2.1.3 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.1						
2 Hi M	46.5	12.4	13.49	1957	2.0	313
3.3.2.1.4 next higher gear at reduced engine speed; same pull and travelling speed as in 3.3.2.1.2						
2 Hi M	31.4	8.2	13.77	1982	1.2	370
3.3.2.2 in selected gear nearest to 7.5 km/h at rated speed						
4 Lo M	59.8	27.8	7.74	2204	4.8	325
3.3.2.2.1 75 % of pull at maximum power at rated speed						
4 Lo M	46.8	20.9	8.06	2263	3.5	353
3.3.2.2.2 50 % of pull at maximum power at rated speed						
4 Lo M	32.0	13.9	8.30	2308	2.4	429
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	46.6	20.9	8.03	2115	3.5	326
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	32.0	13.9	8.28	2156	2.4	389

Specific energy	Temperature			Atmospheric conditions		
	Fuel	Coolant	Engine oil	Temperature	Relative humidity	Pressure
kWh/l	°C	°C	°C	°C	%	kPa
2.18	46	83	104	25	51	96.7
2.24	37	82	102	24	57	96.7
2.47	39	82	104	24	54	96.7
2.70	40	83	105	25	53	96.7
2.77	45	83	107	26	50	96.7
2.78	46	78	104	27	47	96.6
2.84	48	85	106	28	46	96.6
2.81	49	84	106	27	47	96.6
2.84	48	85	105	27	49	96.6
2.86	49	86	105	27	49	96.6
2.84	49	86	105	26	52	96.6
2.76	50	86	106	26	52	96.6
2.62	48	85	102	26	52	96.6
2.36	47	86	96	25	55	96.6
1.94	48	86	101	25	55	96.6
2.68	47	85	100	25	55	96.6
2.27	47	85	98	25	55	96.6
2.58	42	79	98	27	47	96.6
2.38	46	81	103	27	46	96.6
1.96	47	81	104	27	46	96.6
2.57	46	84	102	28	46	96.6
2.16	45	82	99	28	46	96.6

4. OPTIONAL TESTS RESULTS

4.1 BRAKING

Date of tests: 5th February and 16th May 2002

Tractor mass (with driver)

	Front	Rear	Total
	kg	kg	kg
Ballasted tractor	2350	5150	7500
Unballasted tractor	2155	2685	4840

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	39.9	0.145	0.60	102.37
		0.195	1.76	34.90
		0.255	3.29	18.67
		0.310	3.62	16.97
		0.340	4.12	14.91
		0.405	4.70	13.07
Unballasted tractor	40.8	0.115	0.59	108.85
		0.155	1.47	43.69
		0.210	2.92	21.99
		0.255	4.14	15.51
		0.290	4.61	13.93

Maximum deviation of tractor from its original course: Not significant

Abnormal vibration: None

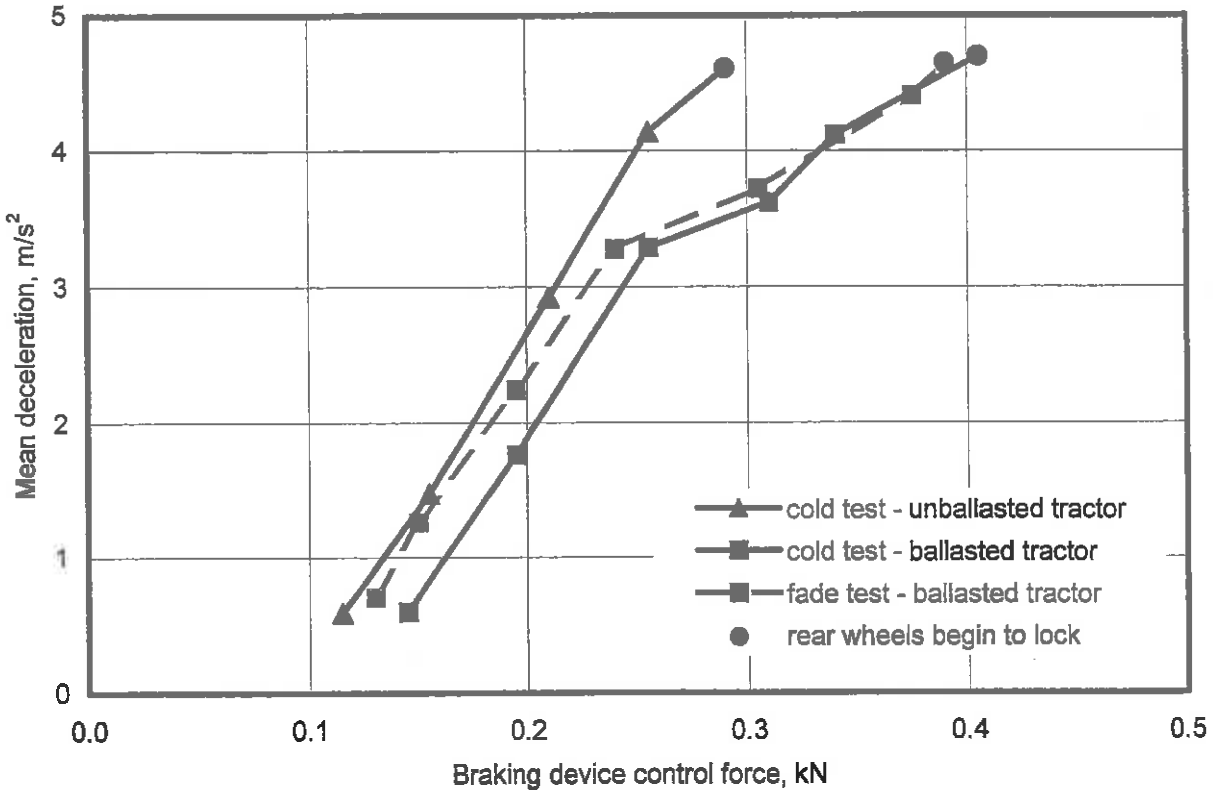
4.1.2 Fade test

	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	39.9	0.130	0.71	86.51
		0.150	1.26	48.75
		0.195	2.24	27.42
		0.240	3.28	18.73
		0.305	3.72	16.51
		0.375	4.41	13.93
		0.390	4.65	13.21

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	0.175	0.165

4.2 MEASUREMENT OF EXTERNAL NOISE

Date of tests: 4th February 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: 30.9 km/h

Sound level: 85.0 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:	30.9 km/h
Sound level:	84.0 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

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Director

Dipl. Ing. Josef Šenk, CSc.