

Technical Sales Documentation		- ENGINE DATA -			MTU Project No.				
Printout: (y-m-d) 2007-12-13									
No.		Index	Unit	16V4000G23					
	Application Group MTU data code Intake air temperature Charge-air coolant temperature Barometric pressure Site altitude above sea level Raw-water inlet temperature		°C °C mbar m °C	3B 1 25 55 1000 100 -					
0. DATA-RELEVANT ENGINE DESIGN CONFIGURATION									
1	Fuel-consumption optimized			X					
2	Exhaust-emissions optimized (limit values see Exhaust Emissions, Chapter 21)			--					
47	"TA-Luft" (German clean-air standard)			--					
17	Complies with: Regulations for stationary power plants in France (arrêté du 25 Juillet 1997)			--					
18	Complies with: US EPA, regulation for nonroad engines (40 CFR 89 - Tier 1 -)			--					
37	Complies with: US EPA regulations for nonroad engines (40 CFR 89 - Tier 1 -) NOx-20%			--					
33	Complies with: US EPA regulations for nonroad engines (40 CFR 89 - Tier 1 -) NOx-40%			--					
25	Complies with: US EPA, regulation for nonroad engines (40 CFR 89 - Tier 2 -)			--					
8	Engine rated speed switchable (1500/1800 rpm)			--					
12	Engine with sequential turbocharging (turbochargers with cut-in/cut-out control)			--					
13	Engine without sequential turbocharging (turbochargers without cut-in/cut-out control)			X					
1. POWER-RELATED DATA (power ratings are net brake power to ISO 3046)									
1	Engine rated speed	A	rpm	1500					
3	Mean piston speed		m/s	10.5					
4	Continuous power ISO 3046 (10% overload capability) (design power DIN 6280, ISO 8528)	A	kW	1798					
5	Fuel stop power ISO 3046	A	kW	1978					
8	Mean effective pressure (MEP) (Continuous power ISO 3046)		bar	18.9					
9	Mean effective pressure (MEP) (Fuel stop power ISO 3046)		bar	20.7					
2. GENERAL CONDITIONS (for maximum power)									
1	Intake air depression (new filter)	A	mbar	15					
2	Intake air depression, max.	L	mbar	50					
3	Exhaust back pressure	A	mbar	30					
4	Exhaust back pressure, max.	L	mbar	85					
5	Fuel temperature at fuel feed connection	R	°C	25					
10	Fuel temperature at fuel feed connection, max.	L	°C	55					
18	Fuel temperature at fuel feed connection, min.	L	°C	--					
3. CONSUMPTION									
17	Specific fuel consumption (be) - 100 % CP (+ 5 %; EN 590; 42.8 MJ/kg)	G	g/kWh	192					
18	Specific fuel consumption (be) - 75 % CP (+ 5 %; EN 590; 42.8 MJ/kg)	R	g/kWh	195					
19	Specific fuel consumption (be) - 50 % CP (+ 5 %; EN 590; 42.8 MJ/kg)	R	g/kWh	205					

Explanation:

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20	Specific fuel consumption (be) - 25 % CP (+ 5 %; EN 590; 42.8 MJ/kg)	R	g/kWh	232					
21	Specific fuel consumption (be) - FSP (+ 5 %; EN 590; 42.8 MJ/kg)	R	g/kWh	191					
73	No-load fuel consumption	R	kg/h	30,0					
61	Lube oil consumption after 100 h of operation (B = fuel consumption per hour)	R	% of B	0.3					
62	Lube oil consumption after 100 h of operation, max. (B = fuel consumption per hour)	L	% of B	1.0					
4. MODEL-RELATED DATA (basic design)									
3	Engine with exhaust turbocharger (ETC) and intercooler			X					
4	Exhaust piping, non-cooled			X					
5	Exhaust piping, liquid-cooled			--					
33	Working method: four-cycle, diesel, single-acting			X					
34	Combustion method: direct injection			X					
36	Cooling system: conditioned water			X					
37	Direction of rotation: c.c.w. (facing driving end)			X					
6	Number of cylinders			16					
7	Cylinder configuration: V angle		degrees	90					
10	Bore		mm	170					
11	Stroke		mm	210					
12	Displacement, cylinder		liter	4.77					
13	Displacement, total		liter	76.3					
14	Compression ratio			16.5					
40	Cylinder heads: single-cylinder			X					
41	Cylinder liners: wet, replaceable			X					
42	Piston design: composite piston			--					
49	Piston design: solid-skirt piston			X					
24	Number of inlet valves, per cylinder			2					
25	Number of exhaust valves, per cylinder			2					
15	Number of turbochargers			4					
18	Number of intercoolers			1					
28	Standard flywheel housing flange (engine main PTO)		SAE	00					
50	Static bending moment at standard flywheel housing flange, max.	L	kNm	15					
51	Dynamic bending moment at standard flywheel housing flange, max.	L	kNm	75					
43	Flywheel interface		DISC	21					
46	Engine mass diagram, drawing No.								
47	Engine mass diagram, drawing No. (cont.)								
5. COMBUSTION AIR / EXHAUST GAS									
8	Charge-air pressure before cylinder - CP	R	bar abs	2.6					
27	Charge-air pressure before cylinder - FSP	R	bar abs	2.8					
9	Combustion air volume flow - CP	R	m³/s	2.1					
10	Combustion air volume flow - FSP	R	m³/s	2.3					
11	Exhaust volume flow (at exhaust temperature) - CP	R	m³/s	5.4					

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12	Exhaust volume flow (at exhaust temperature) - FSP	R	m³/s	5.8					
15	Exhaust temperature after turbocharger - CP	R	°C	480					
16	Exhaust temperature after turbocharger - FSP	R	°C	485					
6. HEAT DISSIPATION									
15	Heat dissipated by engine coolant - CP with oil heat, without charge-air heat	R	kW	710					
16	Heat dissipated by engine coolant - FSP with oil heat, without charge-air heat	R	kW	730					
26	Charge-air heat dissipation - CP	R	kW	260					
27	Charge-air heat dissipation - FSP	R	kW	320					
31	Heat dissipated by return fuel flow - CP	R	kW	13					
32	Heat dissipated by return fuel flow - FSP	R	kW	13					
33	Radiation and convection heat, engine - CP	R	kW	90					
34	Radiation and convection heat, engine - FSP	R	kW	90					
7. COOLANT SYSTEM (high-temperature circuit)									
17	Coolant temperature (at engine outlet to cooling equipment)	A	°C	100					
57	Coolant temperature differential after/before engine, from	R	°C	7					
58	Coolant temperature differential after/before engine, to	R	°C	9					
23	Coolant temperature differential after/before engine	L	°C	11					
20	Coolant temperature after engine, alarm	R	°C	102					
21	Coolant temperature after engine, shutdown	L	°C	104					
25	Coolant antifreeze content, max.	L	%	50					
30	Cooling equipment: coolant flow rate	A	m³/h	68.5					
35	Coolant pump: inlet pressure, min.	L	bar	0.2					
36	Coolant pump: inlet pressure, max.	L	bar	1.5					
41	Pressure loss in off-engine cooling system, max.	L	bar	0.7					
47	Breather valve (expansion tank) opening pressure (excess pressure)	R	bar	1.0					
48	Breather valve (expansion tank) opening pressure (depression)	R	bar	-0.1					
54	Cooling equipment: height above engine, max.	L	m	15					
53	Cooling equipment: operating pressure	A	bar	2.5					
73	Coolant level in expansion tank, below min. alarm	L		--					
74	Coolant level in expansion tank, below min. shutdown	L		X					
50	Thermostat, starts to open	R	°C	79					
8. COOLANT SYSTEM (low-temperature circuit)									
9	Coolant temperature before intercooler (at engine inlet from cooling equipment)	A	°C	55					
14	Coolant temperature before intercooler, alarm	R	°C	75					
61	Coolant temperature before intercooler, shutdown	L	°C	--					
54	Coolant temperature differential after/before intercooler, min.	L	°C	6					
55	Coolant temperature differential after/before intercooler, max.	L	°C	10					

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13	Coolant antifreeze content, max.	L	%	50					
17	Charge-air temperature after intercooler, max.	L	°C	80					
76	Temperature differential between intake air and charge-air coolant before intercooler	A	K	30					
75	Temperature differential between intake air and charge-air coolant before intercooler, max.	L	K	22					
45	Charge-air temperature after intercooler, max. for compliance with "TA-Luft" at CP	L	°C	--					
20	Cooling equipment: coolant flow rate	A	m³/h	30					
21	Intercooler: coolant flow rate	R	m³/h	30					
24	Coolant pump: inlet pressure, min.	L	bar	0.2					
25	Coolant pump: inlet pressure, max.	L	bar	1.5					
29	Pressure loss in off-engine cooling system, max.	L	bar	0.7					
43	Cooling equipment: height above engine, max.	L	m	15					
36	Breather valve (expansion tank) opening pressure (excess pressure)	R	bar	1.0					
37	Breather valve (expansion tank) opening pressure (depression)	R	bar	-0.1					
42	Cooling equipment: operating pressure	A	bar	2.5					
67	Coolant level in expansion tank, below min. alarm	L		--					
68	Coolant level in expansion tank, below min. shutdown	L		X					
39	Thermostat, starts to open	R	°C	38					
10. LUBE OIL SYSTEM									
1	Lube oil operating temp. before engine, from	R	°C	89					
2	Lube oil operating temp. before engine, to	R	°C	95					
5	Lube oil temperature before engine, alarm	R	°C	97					
6	Lube oil temperature before engine, shutdown	L	°C	99					
8	Lube oil operating press. bef. engine, from	R	bar	4.2					
9	Lube oil operating press. bef. engine, to	R	bar	5.5					
10	Lube oil pressure before engine, alarm	R	bar	--					
11	Lube oil pressure before engine, shutdown	L	bar	--					
19	Lube oil fine filter (main circuit): number of units			5					
20	Lube oil fine filter (main circuit): number of elements per unit			1					
21	Lube oil fine filter (main circuit): particle retention	R	mm	0.012					
32	Lube oil fine filter (main circuit): pressure differential, max.	L	bar	1.5					
11. FUEL SYSTEM									
1	Fuel pressure at fuel feed connection, min. (when engine is starting)	L	bar	-0.1					
2	Fuel pressure at fuel feed connection, max. (when engine is starting)	L	bar	1.5					
65	Fuel pressure at fuel feed connection, max. (permanent)	L	bar	0.5					
37	Fuel supply flow, max.	R	liter/min	14					

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8	Fuel return flow, max.	R	liter/min	6					
10	Fuel pressure at return connection on engine, max.	L	bar	0.5					
12	Fuel temperature differential before/after engine	R	°C	16					
38	Fuel temperature after high-pressure pump, alarm	L	°C	100					
39	Fuel temperature after high-pressure pump, shutdown	L	°C						
15	Fuel prefilter: number of units	A		--					
16	Fuel prefilter: number of elements per unit	A		--					
17	Fuel prefilter: particle retention	A	mm	--					
18	Fuel fine filter (main circuit): number of units	A		1					
19	Fuel fine filter (main circuit): number of elements per unit	A		1					
20	Fuel fine filter (main circuit): particle retention	A	mm	0.005					
21	Fuel fine filter (main circuit): pressure differential, max.	L	bar	1.0					
12. GENERAL OPERATING DATA									
1	Cold start capability: air temperature (w/o starting aid, w/o preheating) - (case A)	R	°C	10					
2	Additional condition (to case A): engine coolant temperature	R	°C	10					
3	Additional condition (to case A): lube oil temperature	R	°C	10					
4	Additional condition (to case A): lube oil viscosity	R	SAE	30					
9	Cold start capability: air temperature (w/o starting aid, w/ preheating) - (case C)	R	°C	0					
10	Additional condition (to case C): engine coolant temperature	R	°C	40					
11	Additional condition (to case C): lube oil temperature	R	°C	-10					
12	Additional condition (to case C): lube oil viscosity	R	SAE	15W40					
13	Cold start capability: air temperature (w/ starting aid, w/ preheating) - (case D)	R	°C	-15					
14	Additional condition (to case D): engine coolant temperature	R	°C	40					
15	Additional condition (to case D): lube oil temperature	R	°C	-15					
16	Additional condition (to case D): lube oil viscosity	R	SAE	10W40					
21	Coolant preheating, heater performance (standard)	R	kW	9					
22	Coolant preheating, preheating temperature (min.)	R	°C	32					
28	Breakaway torque (without driven machinery) coolant temperature +5°C	R	Nm	2200					
30	Breakaway torque (without driven machinery) coolant temperature +40°C	R	Nm	1750					
29	Cranking torque at firing speed (without driven machinery) coolant temperature +5°C	R	Nm	1200					
31	Cranking torque at firing speed (without driven machinery) coolant temperature +40°C	R	Nm	880					
96	Starting is blocked if the engine coolant temperature is below		°C	0					
93	Run-up period to rated speed (with driven machinery) (* at general conditions)	R	s	6					
37	High idling speed, max. (static)	L	rpm	1700					
38	Limit speed for overspeed alarm / emergency shutdown	L	rpm	1750					

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42	Firing speed, from	R	rpm	80					
43	Firing speed, to	R	rpm	120					
44	Engine coolant temperature before starting full-load operation, recommended min. (for emergency/standby sets with coolant preheating: at least the preheating temperature)	L	°C	60					
48	Minimum continuous load	R	%	20					
50	Engine mass moment of inertia (without flywheel)	R	kgm²	12.7					
51	Engine mass moment of inertia (with standard flywheel)	R	kgm²	23.1					
55	Load application sequence (1st load stage) (seconds after start command) (* at additional conditions)	R	s						
56	Load application sequence (2nd load stage) (seconds after start command) (* at additional conditions)	R	s						
57	Load application sequence (3rd load stage) (seconds after start command) (* at additional conditions)	R	s						
58	Load application sequence (1st load stage) (% of engine continuous power) (* at additional conditions)	R	%						
59	Load application sequence (2nd load stage) (% of engine continuous power) (* at additional conditions)	R	%						
60	Load application sequence (3rd load stage) (% of engine continuous power) (* at additional conditions)	R	%						
94	Additional conditions*: engine preheated, transient speed droop max. -10 %, plant mass moment of inertia, min.	R	kgm²						
69	Speed droop (with electronic governor) adjustable, from	R	%	0					
70	Speed droop (with electronic governor) adjustable, to	R	%	10					
95	Number of starter ring-gear teeth on engine flywheel			182					
13. STARTING (electric)									
12	Starter, rated power (make DELCO) (standard design)	R	kW	--					
2	Starter, rated voltage (standard design)	R	V=	24					
14	Starter, power requirement max. (make DELCO)	R	A	--					
15	Starter, power requirement at firing speed (make DELCO)	R	A	--					
16	Start attempt duration (engine preheated)	R	s	3					
17	Start attempt duration (engine not preheated)	R	s	N					
18	Start attempt duration, max.	L	s	30					
15. STARTING (pneumatic/oil pressure starter)									
5	Starting air pressure before starter motor, min.	R	bar	8					
6	Starting air pressure before starter motor, max.	R	bar	10					
7	Starting air pressure before starter motor, min.	L	bar	8					
8	Starting air pressure before starter motor, max.	L	bar	10					
18	Start attempt duration (engine preheated)	R	s	3					
19	Start attempt duration (engine not preheated)	R	s	5					

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20	Start attempt duration, max.	L	s	--					
21	Air consumption / start attempt (engine preheated)	R	m^3n	0.6					
23	Starting air tank for 3 start attempts (max. 40 bar) (engine preheated)	R	liter	55					
24	Starting air tank for 3 start attempts (max. 30 bar) (engine preheated)	R	liter	75					
25	Starting air tank for 6 start attempts (max. 40 bar) (engine preheated)	R	liter	110					
26	Starting air tank for 6 start attempts (max. 30 bar) (engine preheated)	R	liter	150					
27	Starting air tank for 10 start attempts (max. 40 bar) (engine preheated)	R	liter	185					
28	Starting air tank for 10 start attempts (max. 30 bar) (engine preheated)	R	liter	250					
16. INCLINATIONS - STANDARD OIL SYSTEM (ref.: waterline)									
15	Longitudinal inclination, continuous max. driving end down (Option: max. operating inclinations)	L	degrees	5					
16	Longitudinal inclination, temporary max. driving end down (Option: max. operating inclinations)	L	degrees	--					
17	Longitudinal inclination, continuous max. driving end up (Option: max. operating inclinations)	L	degrees	5					
18	Longitudinal inclination, temporary max. driving end up (Option: max. operating inclinations)	L	degrees	--					
19	Transverse inclination, continuous max. (Option: max. operating inclinations)	L	degrees	10					
20	Transverse inclination, temporary max. (Option: max. operating inclinations)	L	degrees	--					
27	Longitudinal inclination, continuous max. driving end down (Option: max. replenishment period)	L	degrees						
28	Longitudinal inclination, temporary max. driving end down (Option: max. replenishment period)	L	degrees						
29	Longitudinal inclination, continuous max. driving end up (Option: max. replenishment period)	L	degrees						
30	Longitudinal inclination, temporary max. driving end up (Option: max. replenishment period)	L	degrees						
31	Transverse inclination, continuous max. (Option: max. replenishment period)	L	degrees						
32	Transverse inclination, temporary max. (Option: max. replenishment period)	L	degrees						
18. CAPACITIES									
1	Engine coolant capacity (without cooling equipment)	R	liter	175					
10	Intercooler coolant capacity	R	liter	50					
11	On-engine fuel capacity	R	liter	8					
14	Engine oil capacity, initial filling (standard oil system) (Option: max. operating inclinations)	R	liter	300					

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15	Engine oil capacity, initial filling (standard oil system) (Option: max. replenishment period)	R	liter						
20	Oil change quantity, max. (standard oil system) (Option: max. operating inclinations)	R	liter	240					
21	Oil change quantity, max. (standard oil system) (Option: max. replenishment period)	R	liter						
28	Oil pan capacity, dipstick mark min. (standard oil system) (Option: max. operating inclinations)	L	liter	210					
29	Oil pan capacity, dipstick mark max. (standard oil system) (Option: max. operating inclinations)	L	liter	240					
30	Oil pan capacity, dipstick mark min. (standard oil system) (Option: max. replenishment period)	L	liter						
31	Oil pan capacity, dipstick mark max. (standard oil system) (Option: max. replenishment period)	L	liter						
19. WEIGHTS / DIMENSIONS									
9	Engine weight, dry (basic engine configuration acc. to scope of supply specification)	R	kg	7700					
10	Engine weight, wet (basic engine configuration acc. to scope of supply specification)	R	kg						
21. EXHAUST EMISSIONS									
406	"TA-Luft" - CP Nitric oxide (NOx) (5% O2)	G	mg/m ³ n	--					
407	"TA-Luft" - CP Carbon monoxide (CO) (5% O2)	R	mg/m ³ n	--					
408	"TA-Luft" - CP Unburned hydrocarbons (HC)	G	mg/m ³ n	--					
409	"TA-Luft" - CP Dust (5% O2)	G	mg/m ³ n	--					
410	"TA-Luft" - CP Formaldehyde (5% O2)	G	mg/m ³ n	--					
311	Regulation: stationary power plants in France - CP Nitric oxide (NOx) (5% O2)	G	mg/m ³ n	--					
312	Regulation: stationary power plants in France - CP Carbon monoxide (CO) (5% O2)	G	mg/m ³ n	--					
313	Regulation: stationary power plants in France - CP Unburned hydrocarbons (NMHC)	G	mg/m ³ n	--					
314	Regulation: stationary power plants in France - CP Dust / particulates (5% O2)	G	mg/m ³ n	--					
316	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 1 -) Nitric oxide (NOx)	G	g/kWh	--					
371	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 1 -) NOx-20% Nitric oxide (NOx)	G	g/kWh	--					
365	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 1 -) NOx-40% Nitric oxide (NOx)	G	g/kWh	--					

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318	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 1 -) Unburned hydrocarbons (HC)	G	g/kWh	--					
319	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 1 -) Particulates	G	g/kWh	--					
320	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 2 -) Nitric oxide (NOx) + unburned hydrocarbons (HC)	G	g/kWh	--					
321	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 2 -) Carbon monoxide (CO)	G	g/kWh	--					
323	Regulation: US EPA "Nonroad" (40 CFR 89 - Tier 2 -) Particulates	G	g/kWh	--					
141	Exhaust volume flow, dry - CP (standard conditions)	R	m³/h						
143	Exhaust mass flow - CP (reference conditions)	R	kg/h	9906					
144	Residual oxygen content (O2) in dry exhaust - CP (standard conditions)	R	% (vol.)	10					
145	Total combustion calorific value - CP	R	kW						
22. ACOUSTICS									
101	Exhaust noise, unsilenced - CP (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB(A)	112					
201	Exhaust noise, unsilenced - CP (sound power level LW, ISO 6798)	R	dB(A)	125					
102	Exhaust noise, unsilenced - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB(A)	--					
202	Exhaust noise, unsilenced - FSP (sound power level LW, ISO 6798)	R	dB(A)	--					
103	Exhaust noise, unsilenced - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798) Spectrum No.			733632					
203	Exhaust noise,unsilenced - CP (sound power level LW, ISO 6798) Spectrum No.			N					
104	Exhaust noise, unsilenced - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798) Spectrum No.			--					
204	Exhaust noise,unsilenced - FSP (sound power level LW, ISO 6798) Spectrum No.			--					
109	Engine surface noise with attenuated intake noise (filter) - CP (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB(A)	107					
209	Engine surface noise with attenuated intake noise (filter) - CP (sound power level LW, ISO 6798)	R	dB(A)	126					

Explanation:

CP = Ref.value: Continuous power FSP = Ref.value: Fuel stop power
 A = Design value G = Guaranteed value L = Limit value, up to which the engine can be operated, without change (e.g. of power setting) R = Guideline value
 X = Applicable - = Not applicable N = Not yet defined value Z = See notes provided after "ENGINE DATA"

Technical Sales Documentation		- ENGINE DATA -			MTU Project No.				
Printout: (y-m-d) 2007-12-13									
No.		Index	Unit	16V4000G23					
	Application Group MTU data code Intake air temperature Charge-air coolant temperature Barometric pressure Site altitude above sea level Raw-water inlet temperature			3B 1 °C 25 °C 55 mbar 1000 m 100 °C -					
110	Engine surface noise with attenuated intake noise (filter) - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798)	R	dB(A)	--					
210	Engine surface noise with attenuated intake noise (filter) - FSP (sound power level LW, ISO 6798)	R	dB(A)	--					
111	Engine surface noise with attenuated intake noise (filter) - CP (free-field sound-pressure level Lp, 1m distance, ISO 6798) Spectrum No.			733619					
211	Engine surface noise with attenuated intake noise (filter) - CP (sound power level LW, ISO 6798) Spectrum No.			N					
112	Engine surface noise with attenuated intake noise (filter) - FSP (free-field sound-pressure level Lp, 1m distance, ISO 6798) Spectrum No.			--					
212	Engine surface noise with attenuated intake noise (filter) - FSP (sound power level LW, ISO 6798) Spectrum No.			--					
125	Structure borne noise at engine mounting brackets in vertical direction above resilient engine mounts - CP Spectrum No.			733645					
126	Structure borne noise at engine mounting brackets in vertical direction above resilient engine mounts - FSP Spectrum No.			--					
129	Test stand impedance spectrum, Diagram No.								
130	Test stand impedance spectrum, Diagram No. (cont.)								
23. TBO AND LOAD PROFILE (case A)									
15	Maintenance schedule No.								
16	Maintenance schedule No. (cont.)								

Explanation:

CP = Ref.value: Continuous power FSP = Ref.value: Fuel stop power
 A = Design value G = Guaranteed value L = Limit value, up to which the engine can be operated, without change (e.g. of power setting) R = Guideline value
 X = Applicable - = Not applicable N = Not yet defined value Z = See notes provided after "ENGINE DATA"