#96

MODEL SPECIFICATION

BOEING MODEL 553-2-1 GAS-TURBINE ENGINE

(AB VOLVO CONFIGURATION)

D4-3005

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THE BOEING COMPANY
TURBINE DIVISION

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(AB VOLVO CONFIGURATION)

1. DESCRIPTION

The Boeing Model 553-2-1 gas turbine is the latest development in the Boeing gas turbine engine line, and retains the basic mechanical configuration of previous engines. The engine consists of two major sections: a gas-producer and a power-output section. The gas producer contains a single-stage axial compressor and a single-stage centrifugal compressor coupled to a single-stage axial-flow turbine, two transverse combustion chambers of the reverse-flow type, and an accessory-drive section. The power-output section incorporates a second axial-flow turbine, reduction gearing, an accessory drive section, and an output shaft having a special flange to mate with the lay-rub coupling of the Volvo combining gearbox. There is no mechanical coupling between the turbine rotors of the gas-producer and power-output sections. This arrangement permits the gas-producer speed and engine power to be controlled independently of the output-shaft speed, resulting in an engine with output speed variable from stall to rated RPM for either full or part throttle operation. Continuous operation near the stalled output shaft condition does not overheat the engine.

This specification defines the Model 553-2-1 engine furnished to AB Volvo for installation in military vehicles.

II. PERFORMANCE

Standard Conditions, 60°F, 29.92 In. Hg.
(at engine inlet and exhaust)
Reduction gear ratio 7.94:1

Rating	Brake Horsepower at Rated Speed (4200 RPM)*	Maximum Gas-Producer Speed (RPM)	Maximum Exhaust Gas Temperature (°F Average)	Specific Fuel Consumption (Lb/Hp/Hr.) (±5%)
Maximum Intermittent	450	40,700	1120	.74
Maximum Continuous	400	39,700	1050	.75

Output Torque, Ft-Lb (±5%)

Rating	Stall (Breakaway)	1500 RPM	2700 RPM
Maximum Intermittent	1230	1065	810
Maximum Continuous	1157	985	740

During Boeing factory acceptance test, each engine will demonstrate performance (as corrected to standard conditions) within the limits tabulated above. This is the only performance guarantee expressed or implied.

Figures 1, 2 and 3 of this specification show estimated performance at other speeds under standard conditions. Figures 4, 5 and 6 show estimated effects on performance of variations from standard inlet pressure and temperature and exhaust pressure (due to installation and ambient factors).

*The output shaft governor shall limit the rated output speed to 4190 ±20 RPM under full load steady-state conditions.

III. EQUIPMENT AND ACCESSORIES - ENGINE MOUNTED

The following equipment and accessories are supplied with the engine and installed thereon:

1. Fuel pump and governor unit with acceleration limiter. The governor unit is provided with two high speed stop adjustments arranged so that operation at speeds corresponding to either the Maximum Continuous or Maximum Intermittent rating may be selected by the operator by means of a remote control to be supplied by Volvo.
2. Oil pumps on both the gas producer and output sections. The output-section pump is mounted on the left hand side of the engine as viewed from the output end.
3. Ignition system consisting of:

   Two igniters
   High tension leads, radio shielded
   Ignition unit, radio shielded to meet
   U.S. Specification MIL-I-6181D.
4. Single-outlet exhaust collector inclined 40° to the right as viewed from the output-shaft end of the engine.
5. Oil filter - replaceable element type.
6. Starter-generator - 24 volt, 30 ampere.
7. Exhaust-gas temperature thermocouple harness.
8. Electrical junction box. This junction box will contain the starter and ignition relays and will mount electrical receptacles to receive all engine electrical connections. The junction box mating thermocouple connector will be furnished.
9. Start-sequencing switch (speed monitor). This switch is furnished for installation on a power takeoff gearbox to be installed on the engine by Volvo. During Boeing acceptance tests, the switch will be installed on the accessory section power takeoff pad and will be driven by a special drive adapter. For shipping purposes, the drive adapter and oil seal will be removed and the switch remounted on the same pad. The switch will be inoperable in this shipping configuration.
10. Speed-limiting governor for power-output section.
11. Oil pressure transmitter.
12. Low oil pressure switch (nominal setting 20 psig).
13. Oil temperature thermocouple
14. Engine hour meter mounted in junction box cover.

III. EQUIPMENT & ACCESSORIES - ENGINE MOUNTED (Continued)

15. Fuel drain sump fitted with fuel pump seal drain line and suction line to air inlet bell.

16. Fuel control valve - electrically actuated.

17. Air inlet bell with vee-band clamp and rubber inlet plenum seal.

18. Electrical overspeed switch - manual reset.

IV. EQUIPMENT AND ACCESSORIES SUPPLIED WITH ENGINE (To be installed by customer)

The installation drawing number is shown in parentheses after each item.

1. Voltage regulator - 24 volt, 30 ampere, radio shielded to meet U. S. Specification MIL-I-11683. (49-6934 Rev. A)

2. Fuel filter - primary, metal-edge type. (49-6859) Rev. None)

3. Fuel filter - secondary, replaceable-element type. (49-6860 Rev. None)

4. Fuel boost pump - electric, radio shielded to meet U. S. Specification MIL-I-6181B. (49-6858 Rev. A)

5. Exhaust-gas temperature gage - over-temperature electrical, contact set at 1150°F. (49-7137 Rev. None)

6. Lube oil temperature gage - over-temperature electrical, contact set at 220°F. (49-6862 Rev. C)

7. Lube oil pressure gage - electric. (49-7622 Rev. None)

8. Time-delay relay - starting system. (49-6936 Rev. None)

9. Holding relay - starting system. (49-6937 Rev. None)

10. Engine Log Book

V. ACCESSORY DRIVES ON THE GAS-PRODUCER SECTION

Accessory drives are provided on the gas producer section of the engine as shown in the following table:

	Accessory	Ratio to Compressor RPM	Rotation (Looking at Pad)
*	Starter-generator	0.296:1	Clockwise
	Fuel pump and governor	0.1016:1	Clockwise
	Oil pump	0.1066:1	Clockwise
**	Power-takeoff gearbox	0.1066:1	Counterclockwise

* Drive gear mounted on the accessory.

** A power-takeoff gearbox designed to drive a hydraulic pump and a Boeing-furnished sequencing switch will be installed on this pad by Volvo. The maximum continuous torque rating of this pad is 100 lb-in. A maximum emergency torque rating of 150 lb-in. may be used for periods of time which do not collectively exceed 10% of the engine operating time. Provision must be made for unloading the hydraulic pump during the engine starting cycle. No provision for an oil seal is made on this pad in order to permit lubricating oil to enter the Volvo power-takeoff gearbox.

VI ACCESSORY DRIVES ON POWER-OUTPUT SECTION

The following accessory drives are provided on the power-output section:

	Accessory	Ratio to Output Shaft RPM	Rotation (Looking at Pad)
	Governor	0.898:1	Counterclockwise
	Oil pump	0.898:1	Counterclockwise
*	Tachometer (mech)	0.490:1	Counterclockwise
	Overspeed switch	0.308:1	Clockwise

* The tachometer connection will be provided with a protective cover for use when the tachometer connection is not used.

The output-section gear housing includes provision for the installation of one additional accessory-drive. Internal gearing for this pad will not be furnished and a cover plate will be installed.

VII. ENGINE WEIGHT

The dry weight of the engine with the equipment and accessories listed in Section III is estimated to be 385 pounds.

VIII. FUEL SYSTEM (schematic drawing 49-7127 Rev. none)

The Boeing Model 553-2-1 engine has been developed to operate on a number of fuels, including diesel oil, jet engine fuel, and kerosene, without changes to the fuel system. The engine will be adjusted and acceptance-tested using diesel oil conforming to Federal Specification VV-F-800 Grade DF-2, Diesel Fuel Oil 50, or commercial diesel fuel of equivalent quality. Minor external adjustments to the governor, per Boeing instruction, may be necessary for optimum operation on other fuels.

A. Fuel is supplied under pressure to the burner nozzles by the engine-driven fuel pump and governor unit which provides speed control of the gas producer. An acceleration limiter, which controls fuel flow to the engine during rapid movement of the throttle, limits the rate of acceleration of the gas producer from idle to maximum speed and is supplied as an integral part of the fuel pump and governor.

B. Fuel-nozzle pressure normally will vary from approximately 30 psi at idle to approximately 395 psi at maximum rated gas-producer speed.

C. An electrically-operated on-off valve is part of the fuel system. This valve is used during engine starting and is automatically actuated by the sequencing switch during the starting cycle.

D. Fuel supplied to the engine inlet connection shall be at a minimum pressure of 7 psi above the true vapor pressure of the fuel, under all operating conditions, and may contain only contaminants which will pass through a 10-micron upstream filter.

E. Aeroplane Petrol (JP-1) and Jet Petrol (JP-4) conforming to International Standards as well as Diesel Fuel Oil 50 and Kerosene 20, as described on page 18 and 19 of this document, are approved for use in the 553-2-1 engine.

The 553-2-1 engine will operate on Kerosene 35 and Motor Gasoline 15 as described on pages 20 and 21, but the use of these fuels is not recommended. The high gum content of Kerosene 35 makes it objectionable because of the possibility of plugging the gas producer-governor and fuel nozzles. The lead content of Motor Gasoline 15 makes it objectionable because of the possibility of lead bromide and lead oxide attack of the engine hot parts.

IX. ELECTRICAL SYSTEM (schematic drawing 49-7128 Rev. A)

A. The engine electrical system is 24-volt negative-ground.

B. The ignition system consists of a radio-shielded capacitor-discharge ignition unit connected to two air-gap igniters by radio-shielded high-tension leads.

C. The ignition wiring is connected in parallel with the starter circuit, since operation of the ignition system is required only during starting.

D. Electrical wiring. All electrical components installed on the engine will be wired so as to require a minimum number of electrical connections to the engine upon installation in the vehicle. All wiring will be protected with some type of metal-braid covering. Quick-disconnect pin-type connections will be provided as shown on the installation drawing.

E. Radio shielding. In general, the complete vehicle is required to meet U. S. specifications MIL-I-16910A of August 30, 1954 within the 1 to 150 megacycles-per-second frequency range. This has been considered during the design of the engine electrical system.

All engine wiring is provided with metal braid covering to reduce radiated interference. All engine electrical connections are enclosed. The engine-mounted junction box encloses the terminals of the starter-generator, and contains the starter relay. The ignition unit, voltage regulator and fuel boost pump are radio shielded and meet the U. S. Military radio-shielding specifications shown on their respective installation drawings.

X. LUBRICATION SYSTEM (schematic drawing 49-7126 Rev. None)

The complete lubrication system is integral with the engine except for the oil cooler. The oil sump is part of the gas-producer section and has a capacity of 7 U. S. quarts. A triple-element pump on the gas-producer section supplies oil, via a full-flow micronic filter of 10-micron rating, to both the gas-producer and the power-output sections. When the engine is not in operation, and the power-output section is being motored by the load, a double-element pump on the power-output section supplies oil for protection of the bearings and gears.

A. Normal oil consumption is estimated to be less than 1 quart in 15 hours of operation.

A bayonet-type oil dip-stick graduated to indicate "FULL" when the sump contains 7 quarts and "Add oil" at 6 quarts is required to check the oil level. The oil dip-stick will not be furnished with the engine, but will be supplied by Volvo to suit the particular installation.

Oil pressure will normally vary from 30 to 60 psi at rated speed and 20 to 40 psi at idle.

An electrical oil-pressure transmitter is installed on the gas-producer section of the engine. An oil drain plug is located at the bottom of the oil sump.

B. Lubricating oil for use at ambient temperatures above minus 20°C shall be SAE 10 conforming to U. S. Specification MIL-L-2104. Use of other oils including oil for use at ambient temperatures below minus 20°C should be coordinated with The Boeing Company.

Lubrication oil in accordance with U. S. Specification MIL-L-23699 may be used as an alternate lubricating oil for ambient temperatures above -29°C.

Automatic transmission fluid type A, as described on page 22 of this specification may be used as an alternate lubricating oil for ambient temperatures above minus 20°C.

Torque converter fluid Type 1 as described on page 22 of this specification, may be used between the ambient temperatures of minus 40°C and plus 10°C.

C. An oil-temperature thermocouple is installed near the oil inlet connection of the engine to measure the temperature of the oil returning from the oil cooler to the engine. When using SAE 10 or MF-200 oil, the temperature of the oil to the engine should not exceed 220°F. When using MIL-L-23699, the temperature of the oil to the engine should not exceed 235°F. When using MF-62, the temperature of the oil to the engine should not exceed 200°F. The minimum continuous temperature of oil supplied to the engine should not fall below 120°F during normal operation.

D. An oil cooler must be installed in the engine lubrication system so that, during normal engine operation, engine oil temperatures are within the limits of paragraph C above, and oil pressure drop through the cooler system does not exceed 25 pounds per square inch. Maximum pressure to the cooler is 125 psig.

The greatest oil flow rate through the cooler is 14 U. S. gallons per minute plus or minus 10%.

Engine heat rejection to the oil at Maximum Continuous rated power is estimated to be no more than 1300 BTU per minute at 220°F engine inlet oil temperature.

Engine heat rejection to the oil at Maximum Intermittent power is estimated to be no more than 1400 BTU per minute at 220°F engine inlet oil temperature.

XI. INSTALLATION

A. Dimensions and Installation Information

Boeing installation drawing 45-4002 Rev. B shows the pertinent engine installation dimensions and details of all installation connections.

B. Mounting

Provisions for mounting the engine are as shown on the installation drawing. Vertical and transverse loads at the output end of the engine are taken through the output-section mounting flange. Vertical, axial and transverse loads are taken through the forward mounting pad on the gas-producer section of the engine. Torsional loads are taken at the power-output section mounting flange.

C. Engine Attitude

The engine will operate continuously when inclined up to a maximum of 30° in any direction. Operation for short periods (up to one minute) with the output-section elevated or depressed 40° while inclined up to 15° to either side is permissible.

D. Engine Compartment Ventilation

Installation of the engine will require a flow of cooling air for removal of heat radiated from the engine surfaces to prevent overheating of the engine accessories and wiring. The average surface temperature of the combustion and exhaust section castings is about 600 to 650°F under normal operating conditions. A ventilating airflow of approximately 800 cfm at sea level is required. The maximum permissible engine compartment temperature is 200°F (93°C).

It is necessary to use a baffle or other arrangement behind the inlet bell to prevent hot air from entering the compressor inlet. Considerable loss of power can result from allowing heated air to enter the compressor inlet.

E. Output Shaft

1. The output shaft is provided with a special flange to mate with the lay-rub coupling of the Volvo combining gearbox. Dimensional details are as shown on the installation drawing.
2. Shaft rotation is counterclockwise when viewed from the power-output end of the engine.

F. Moments of Inertia

The moments of inertia of the rotating masses of the engine are approximately as follows:

1. Gas-producer rotor assembly, 0.25 lb-in-sec^2
2. Output, section, reffered to output shaft, 13.3 lb-in-sec^2

G. Shock Loading

The engine will safely withstand shock loading in any direction of 5 g's as measured at any point on the engine.

H. Output-Shaft Transient Torque

The output section has been designed for reliable operation over the full range of output-shaft speeds and torques from stall to maximum rated under all ambient conditions.

Analysis of the output section indicates that it will withstand a number of applications of total transient torque loads (0, 1 second duration) without failure as shown below.

Total Transient Torque Lb. Ft.	Average Output Shaft RPM	Number of Applications*
2250	2100	15, 000
1450	2100	Unlimited

* This analysis has not been verified by engine testing.

I. Compressor Inlet Temperature

The engine will operate satisfactorily within temperature limits at the compressor inlet between minus 40°C and plus 55°C, subject to exhaust-gas temperature operating limits.

J. Compressor Bleed Valve

At gas producer speeds below about 36, 000 RPM the compressor bleed valve will discharge air at a maximum temperature of 85°F above ambient temperature; at ambient pressure and at a maximum flow of 0.45 lb/sec.

XII. INSPECTION AND TESTS

Prior to engine shipment, each engine will be inspected and tested according to the applicable Boeing practice. Completed Acceptance Test Data Sheet, a sample of which is shown on page 11 of this document, will be forwarded with each engine delivered.

THE BOEING COMPANY
INDUSTRIAL PRODUCTS DIVISION
GAS TURBINE ENGINE ACCEPTANCE TEST RECORD

Engine Model No. _____ Engine Serial No. _____

Tested to B. T. S. No. _____ Test Date _____

FUEL

Type _____ Specification _____

LUBRICATING OIL

Type _____

GAS-PRODUCER IDLE SPEED _____ RPM

LUBRICATING OIL PRESSURE (180 - 200°F oil temperature into engine)

Shaft Speed		Oil Temperature	Engine Oil Pressure
Gas Producer	Output Shaft	Into Engine	
_____ RPM	_____ RPM	_____ °F	_____ PSIG
_____ RPM (Idle)	_____ RPM	_____ °F	_____ PSIG

ENGINE PERFORMANCE DATA (Corrected to 60°F and 29.92 In. Hg.)

	Normal Continuous Governor Stop	Maximum Intermittent Governor Stop
Brake Horsepower @ Output Shaft Speed	____ HP@ ____ RPM	____ HP@ ____ RPM
Gas Producer Speed	_____ RPM	_____ RPM
Exhaust Gas Temperature (Average)	_____ °F	_____ °F
Specific Fuel Consumption	_____ LB/HP/HR	_____ LB/HP/HR
Output Torque @ Stall (Breakaway)	_____ LB-FT	_____ LB-FT
@ 1500 RPM	_____ LB-FT	_____ LB-FT
@ 2700 RPM	_____ LB-FT	_____ LB-FT
Output Section Governor Check (Steady State, No Load)		
Maximum Output Shaft Speed	_____ RPM	_____ RPM
@ Gas Producer Speed	_____ RPM	_____ RPM
Overspeed Trip Setting		_____ RPM
ENGINE OPERATING TIME (Prior to shipment)	_____ HRS	_____ MINS

CERTIFIED QUALITY CONTROL DEPT DATE

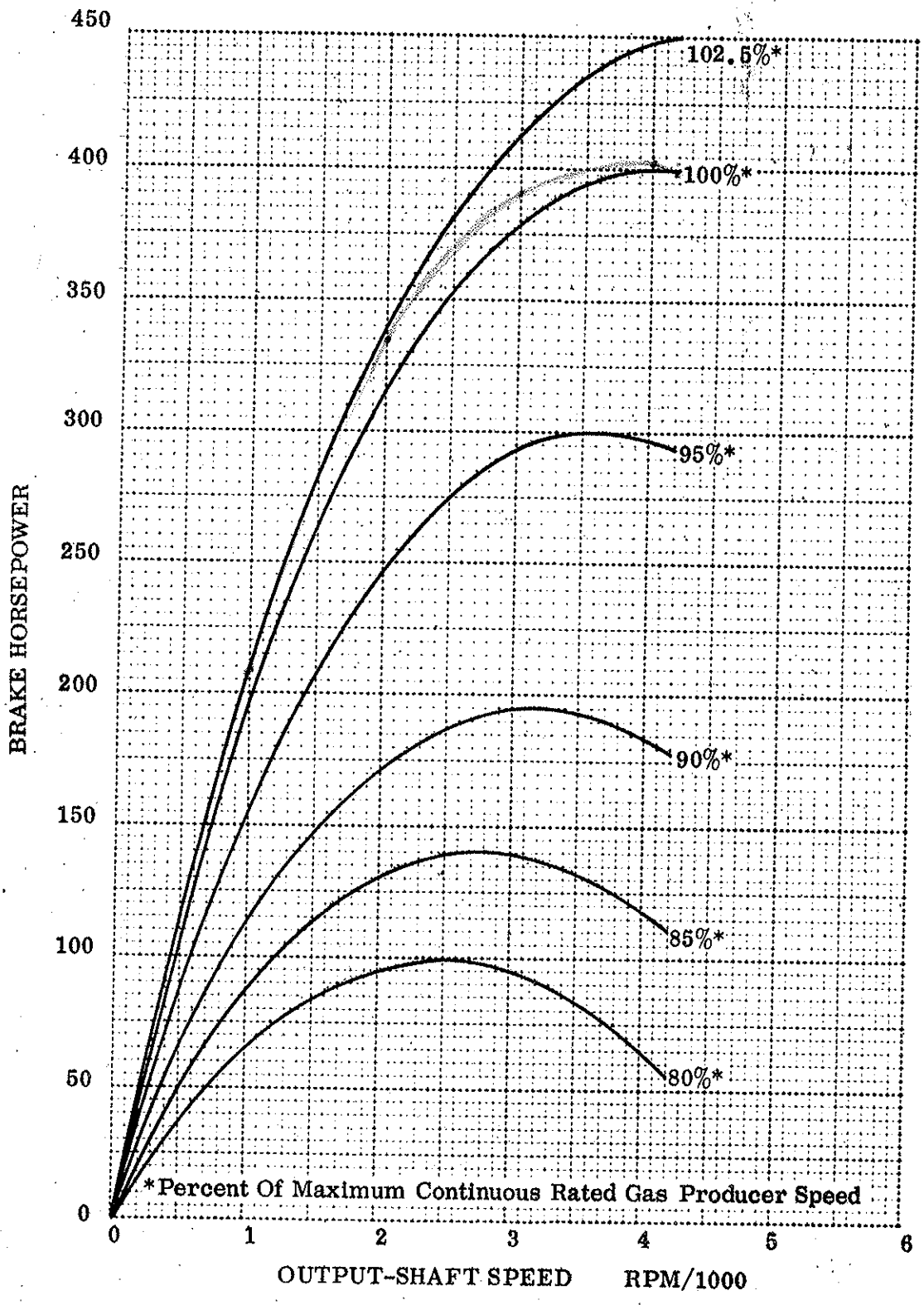

Figure 1 BRAKE HORSEPOWER
Estimated Performance
Ambient Conditions 60°F & 29.92 in. Hg.

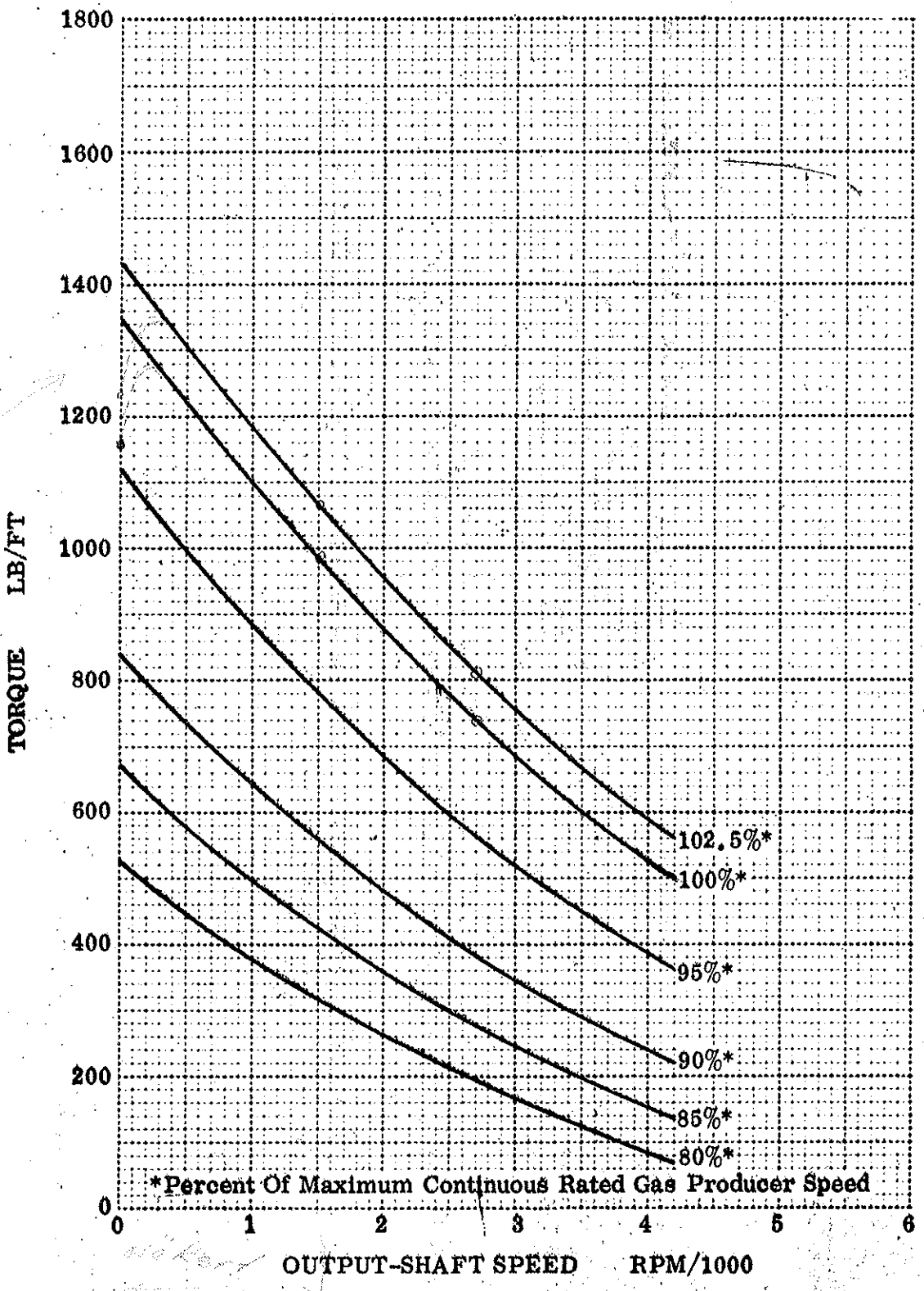

Figure 2 OUTPUT TORQUE
Estimated Performance
Ambient Conditions 60°F & 29.92 in. Hg.

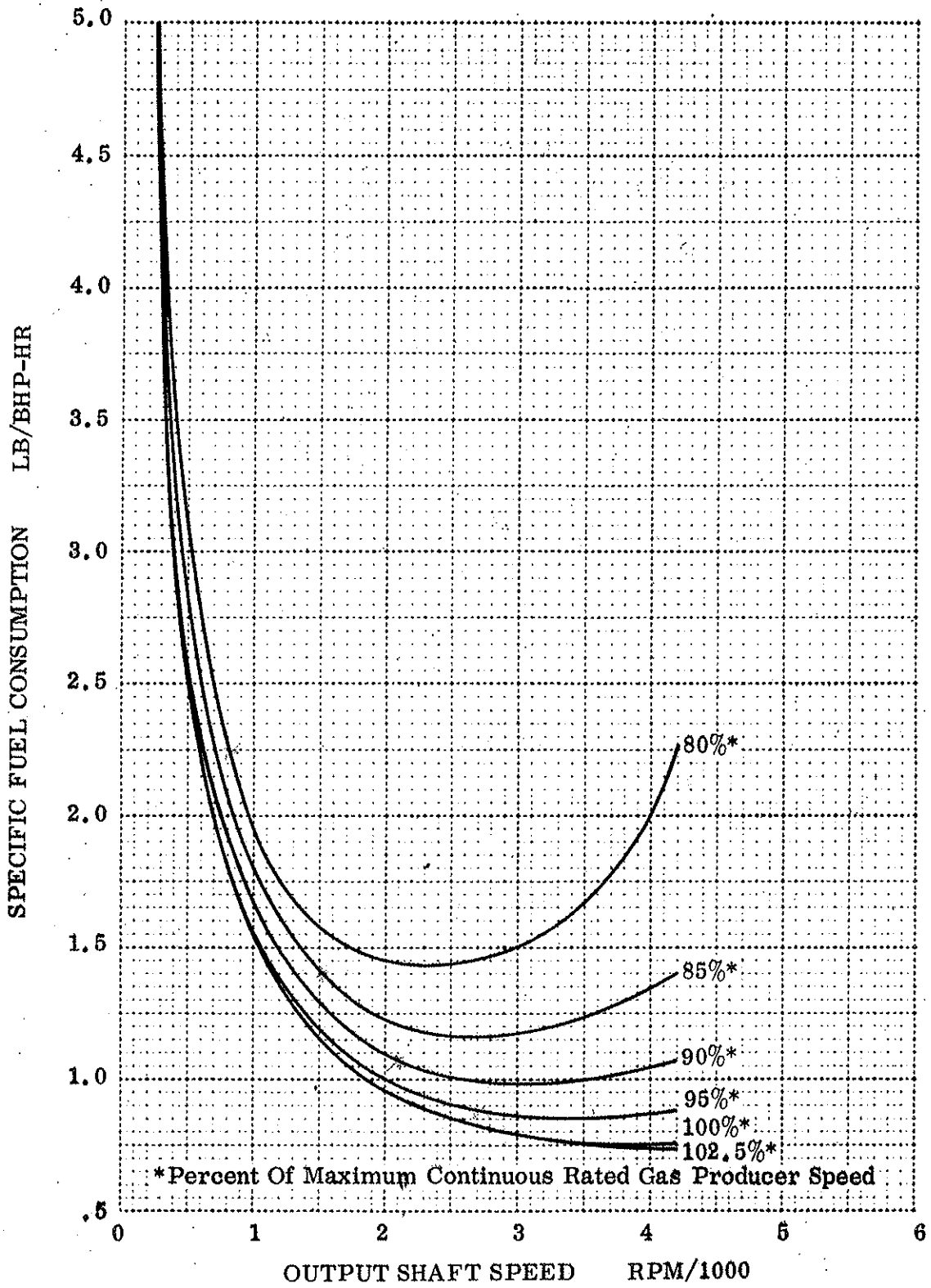

Figure 3 SPECIFIC FUEL CONSUMPTION
Estimated Performance
Ambient Conditions 60°F & 29.92 in. Hg.

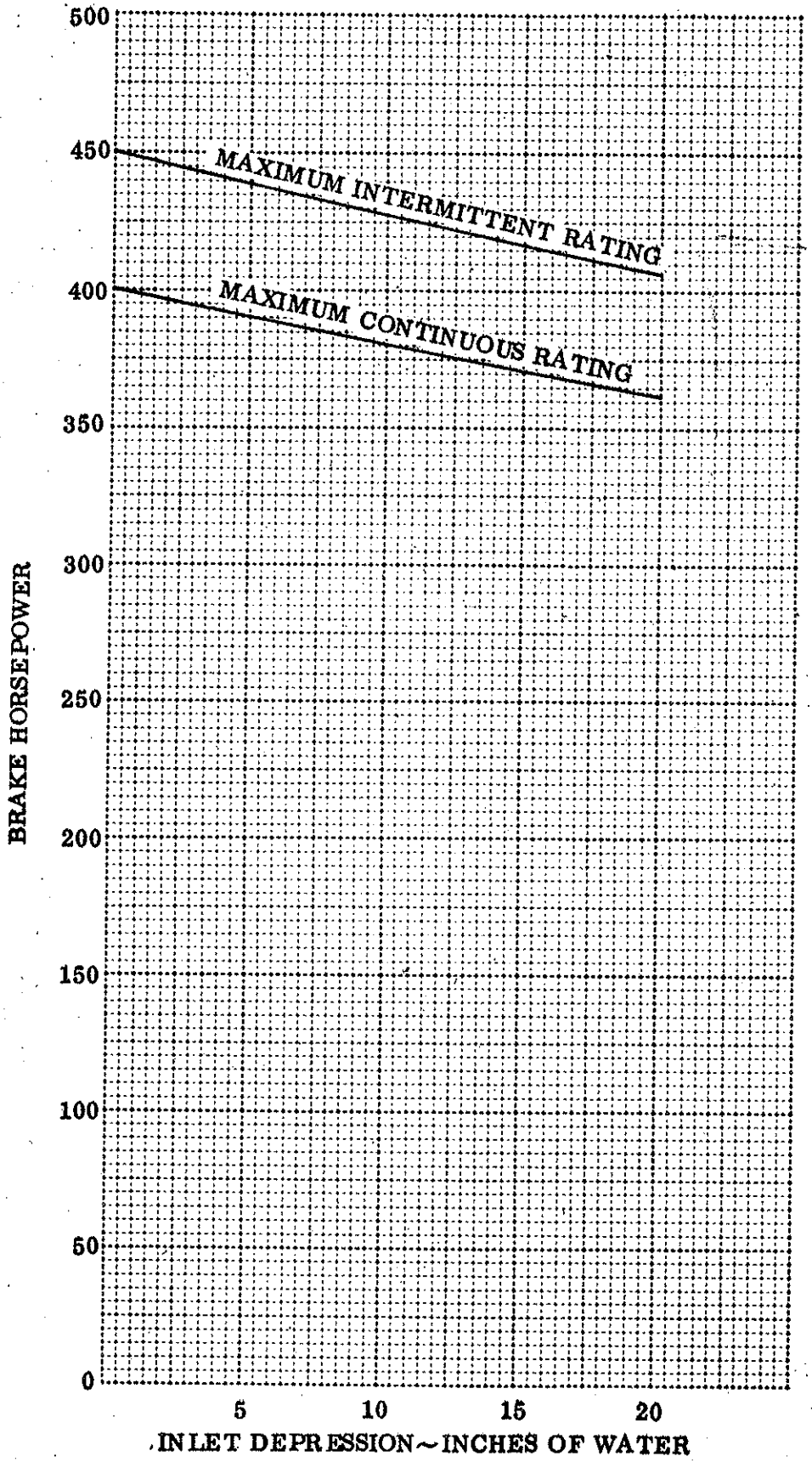

FIGURE 5 INLET DEPRESSION
Estimated Performance
Ambient Conditions 60°F & 29.92 in. Hg

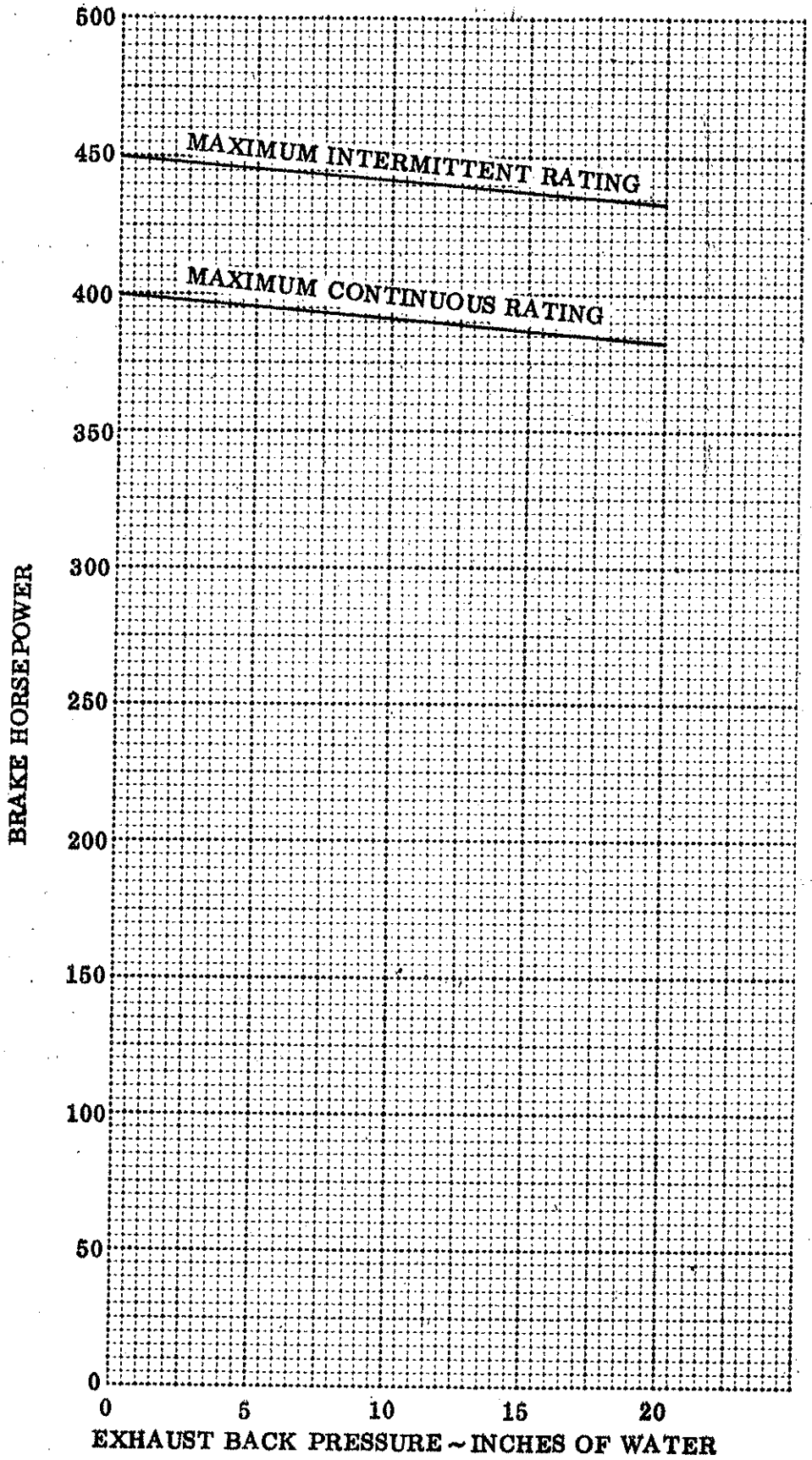

FIGURE 6 EXHAUST BACK PRESSURE
Estimated Performance
Ambient Temperature 60°F & 29.92 in. Hg

Quality Requirements: Diesel fuel oil 50

Sampling according to ASTM D 270 - 55 T

Property	Unit	Requirement	Test Method
Solid contaminants		None	Ocular inspection
Water	% by volume	Not more than 0.05	ASTM D 95 - 58 T
Sediment	% by weight	Not more than 0.01	ASTM D 473 - 59
Specific gravity at 20°C	gm/ml	To be noted	ASTM D 1298 - 55
Ignition quality	Cetane number	Not less than 45	ASTM D 613 - 61 T
Flash point PM	°C	Not less than 41	ASTM D 93 - 61
Viscosity at 20°C	Centistokes	Not less than 2.0 Not more than 8	ASTM D 445 - 61
Cloud point Pour point	°C °C	Not more than -21 Not more than -27	ASTM D 97 - 57
Distillation temp over-dist of 50% by vol. temp over-dist of 90% by vol. end point	 °C °C °C	 To be noted Not more than 320 Not more than 365	 ASTM D 86 - 61
Ramsbottom carbon residue on 10% residuum	% by weight	Not more than 0.20	ASTM D 524 - 59
Ash content	% by weight	Not more than 0.01	ASTM D 482 - 59 T
Sulfur content (bomb method)	% by weight	Not more than 0.5	ASTM D 129 - 60
Corrosion		Not more than Classification 2	ASTM D 130 - 56 (3 hr at + 100°C)
Net heat of combustion	kcal/kg BTU/LB	Not less than 10,100 18,200	ASTM D 240 - 57 T

Quality Requirements: Kerosene 20 (Water White)
(For use in heating and lighting)

Sampling according to ASTM D 270 - 55 T

Property	Unit	Requirement	Test Method
Appearance		Clear	Ocular inspection
Undissolved water		None	
Solid contaminants		None	
Color		To be noted	ASTM D 156 - 53 T
Specific gravity at 20°C	gm/ml	To be noted	ASTM D 1298 - 55
Flash point	°C	Not less than 41	SIS 150222
Smoke point	mm	Not less than 35	ASTM D 1322 - 59 T
Distillation			ASTM D 86 - 61
temp over-dist of 10% by vol.	°C	To be noted	
temp over-dist of 50% by vol.	°C	To be noted	
temp over-dist of 90% by vol.	°C	To be noted	
end point	°C	To be noted	
Sulfur content (lamp method)	% by weight	To be noted	ASTM D 1266 - 59 T
Corrosion		To be noted	ASTM D 130 - 56 (3 hr at + 50°C)
Gum value	mg/100 ml	To be noted	ASTM D 381 - 61 T
Net heat of combustion	kcal/kg	To be noted	ASTM D 290 - 57 T
A. P. I. Gravity at 60°F		45.5 to 52.0	
Viscosity at -30°F	Centistokes	about 5	
Freezing point		-42°F to -47°F	
Mercaptan Sulphur	% by weight	less than 0.01	
Total Sulphur	% by weight	0.02 to 0.06	
Existing Gum	mg/100 ml	less than 2	
Potential Gum	mg/100 ml	less than 5	
Aromatic Content	% by volume	4.5 to 9.0	
Water Tolerance	ml change	less than 2	
Net Heat Content	BTU/LB	about 19,000	

Quality Requirements: Kerosene 35
((Tractor Vaporizing Oil)
Sampling according to ASTM D 270 - 55 T

Property	Unit	Requirement	Test Method
Appearance		Clear	Ocular Inspection
Undissolved water		None	
Solid Contaminants		None	
Specific gravity at 20°C	gm/ml	To be noted	ASTM D 1298 - 55
Knock value	Octane number (Motor)	Not less than 50	ASTM D 357 - 61 (Motor method)
Lead content	gm/cm^3	None	ASTM D 526 - 61
Flash point AP	°C	Not less than 31	SIS 150222
Distillation			
temp over-dist of 10% by vol.	°C	Not more than 185	
temp over-dist of 50% by vol.	°C	Not more than 220	
end point	°C	Not more than 290	
residue	% by volume	Not more than 2	
Sulfur content (lamp method)	% by weight	Not more than 0.35	ASTM D 1266 - 59 T
Corrosion		Not more than Classification 1	ASTM D 130 - 56 (3 hr at + 50°C)
Gum value	mg/100 ml	To be noted	ASTM D 381 - 61 T
A. P. I. Gravity at 60°F		41.5 to 43.5	
Viscosity at -30°F	Centistokes	less than 5	
Freezing point		-60°F	
Mercaptan Sulphur	% by weight	less than 0.01	
Total Sulphur	% by weight	0.10 to 0.35	
Existing Gum	mg/100 ml	1 to 22	
Potential Gum	mg/100 ml	10 to 40	
Aromatic Content	% by volume	25 to 35	
Water Tolerance	ml change	less than 2	
Net Heat Content	BTU/LB	about 20,000	

Quality Requirements: Motor gasoline 15
Sampling according to ASTM D 270 - 55 T

Property	Unit	Requirement	Test Method
Appearance		Clear	ocular inspection
Undissolved water		None	
Solid contaminants		None	
Specific gravity at 20°C	gm/ml	To be noted	ASTM D 1298 - 55
Knock value	octane number (Motor)	Not less than 83	ASTM D 357 - 61 (Motor method)
	octane number (Research)	Not less than 94	ASTM D 908 - 61 (Research method)
Lead content	gm/cm^3	Not more than 0.85	ASTM D 526 - 61
Anti-icing additive			
type		To be noted	
quantity	% by weight	To be noted	
Distillation			
temp over-dist of 10% by vol.	°C	Not more than 70	ASTM D 86 - 61
temp over-dist of 50% by vol.	°C	Not more than 125	
temp over-dist of 90% by vol.	°C	Not more than 180	
end point	°C	Not more than 205	
residue	% by volume	Not more than 2	
Vapor pressure	kg/cm^2	Not more than 0.80	ASTM D 323 - 58
Sulfur content (lamp method)	% by weight	Not more than 0.10	ASTM D 1266 - 59 T
Corrosion		Not more than Classification 1	ASTM D 130 - 56
Gum value	mg/100 ml	Not more than 2	ASTM D 380 - 61 T
Oxidation stability	min	Not less than 1000	ASTM D 525 - 55

AUTOMATIC TRANSMISSION FLUID TYPE A
(Mobile Fluid 200)

Physical Characteristics

API Gravity	29.3 nominal
Flash Point (by C.O.C. test)	370°F minimum
Pour Point	-40°F maximum
Viscosity	203 SSU at 100°F
Viscosity	51.0/52.5 SSU at 210°F
Viscosity Index	138 minimum

TORQUE CONVERTER FLUID TYPE 1
(Mobile Fluid 62)

Physical Characteristics

API Gravity	30.3 nominal
Flash Point (by C.O.C. test)	285°F minimum
Pour Point	-40°F maximum
Viscosity	60/65 SSU at 100°F
Viscosity	35/40 SSU at 210°F
Viscosity Index	86 minimum