



Specifications for Volkswagen Industrial Engine

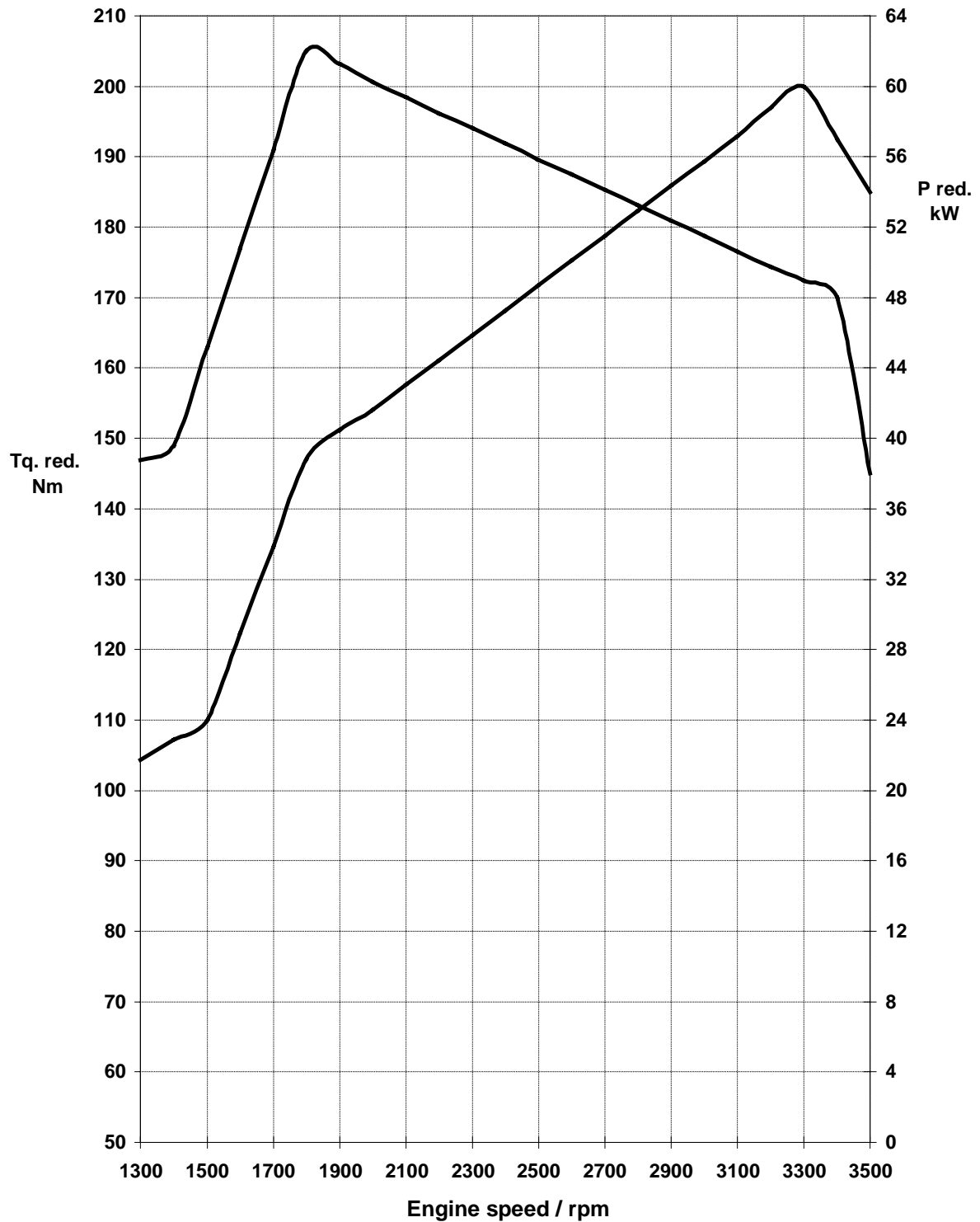
AFD 1.9 ltr. TDI diesel engine
EURO 2

Volkswagen AG, Wolfsburg

Volkswagen AG reserves the right to introduce amendments or corrections at any time without any obligation to implement these on engine already delivered.

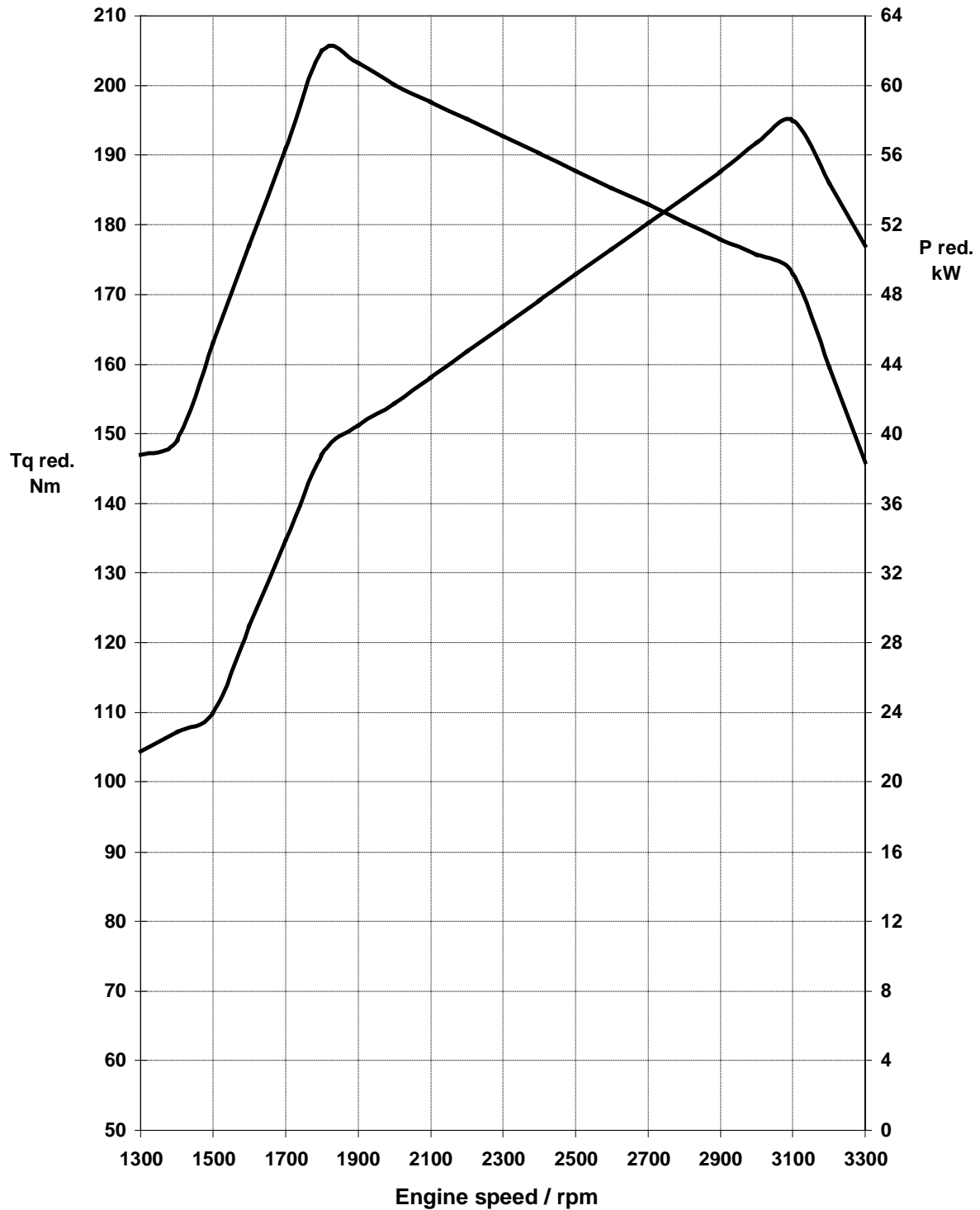


Control unit 028 906 021 CS "Coding 01"





Control unit 028 906 021 CS "Coding 02"





Manufacturer's declaration in accordance with Article 4, Paragraph 2 in conjunction with Appendix II, Section B of Directive 89/392/EEC in the version 93/44/EEC

Note

The engine described is intended for installation in a machine in the sense of the EC Machines Guidelines. It is not permitted to take this engine into operation until it has been demonstrated that the machine into which this engine is to be installed complies with the stipulations of the EC Machines Guidelines (89/392/EEC, last amended by 93/44/EEC).

Introduction

The Volkswagen industrial engine with the engine code **AFD** is a 1.9-litre water-cooled 4-cylinder in-line diesel engine with direct injection, exhaust gas turbocharger and intercooler. With the numerous different areas of application for this engine, the notes on the following pages should be studied carefully prior to the development of new machines. This is to ensure problem-free operation and a long service life for the entire machine, under all operating conditions.

Design: Direct valve control via toothed-belt-driven overhead camshaft (ohc).
Maintenance-free valve drive via hydraulic tappets. Distributor-injection pump electronically governed by control unit and driven by toothed belt.

Displacement	cm ³	1896
Bore / stroke	mm	79.5 / 95.5
Compression ratio		19.5 : 1
Firing sequence		1-3-4-2

Output (with IMO control unit part No. 028 906 021 CS)


Coding 01:

Nmax at 3300 rpm	kW	60	(89/491/EEC)
Tmax at 1800 rpm	Nm	205	
upper idle	rpm	3800	(not adjustable)
lower idle	rpm	875...950	(not adjustable)

Coding 02:

Nmax at 3100 rpm	kW	58	(89/491/EEC)
Tmax at 1800 rpm	Nm	205	
upper idle	rpm	3500	(not adjustable)
lower idle	rpm	875...950	(not adjustable)



Charge pressure (overpressure)		
before intercooler	bar	0.92
after intercooler	bar	0.9
Installation angle		20
Distributor injection pump	Manufacturer	Bosch EDC
Control unit	Manufacturer	Bosch MSA 15
Fuel		Diesel
required cetane number	CN	> 49
as per	EN	590
Fuel consumption	g / kWh	see page 8
Alternator 12 V	A	70
Starter motor 12V	kW	1.8
Battery 12V	A (Ah)	380 (63) minimum capacity
Glow plugs	V	12
Lubrication		Force feed lubrication with gear pump, oil filter in main stream
Oil pressure at 2000 rpm and 80°C (176°F)	bar (overpressure)	min. 2.0
Oil consumption	ltr./hr	0.05 - 0.1
Engine oil quality		Branded oils as per oil specifications given in instruction manual
Oil cooler		Oil / water heat exchanger
Cooling system		Sealed cooling system (pressurised system with separate expansion tank and pressure control valve)



Pressure control valve

opens at bar 1.2 - 1.5
(overpressure)

Coolant

as anti-freeze and corrosion inhibitor, 60% water and 40% G12 A8D coolant additive (sufficient protection to cold start temperature

limit)

Cold start temperature limit

°C (°F) -25 (-13)


Moments of inertia

Crankshaft, complete	kgm ²	0.033
Flywheel	kgm ²	0.0935
Clutch	kgm ²	0.0056
Pressure plate	kgm ²	0.0473

Additional power take off from pulley

Nm 50 radial or axial via crankshaft.

Permissible operating angle

all directions  (%) 35 (70)

Weight

dry engine kg ca. 135

Capacities

Coolant circuit

ltr. app. 5-6 (depending on cooling system)

For initial filling, gradually add the coolant mixture, constantly bleeding the cooling system, until the max mark is reached. Run the engine warm until the thermostat is fully open. Stop the engine and allow it to cool down before checking and correcting the coolant level.

Oil circuit

with filter change ltr. 4.5

Difference in quantity between min and max marks on oil dip stick

ltr. app. 1.0



Temperatures

Coolant

perm. temperatures	°C (°F)	105 (221) permanent
operation	°C (°F)	118 (244) absolute limit

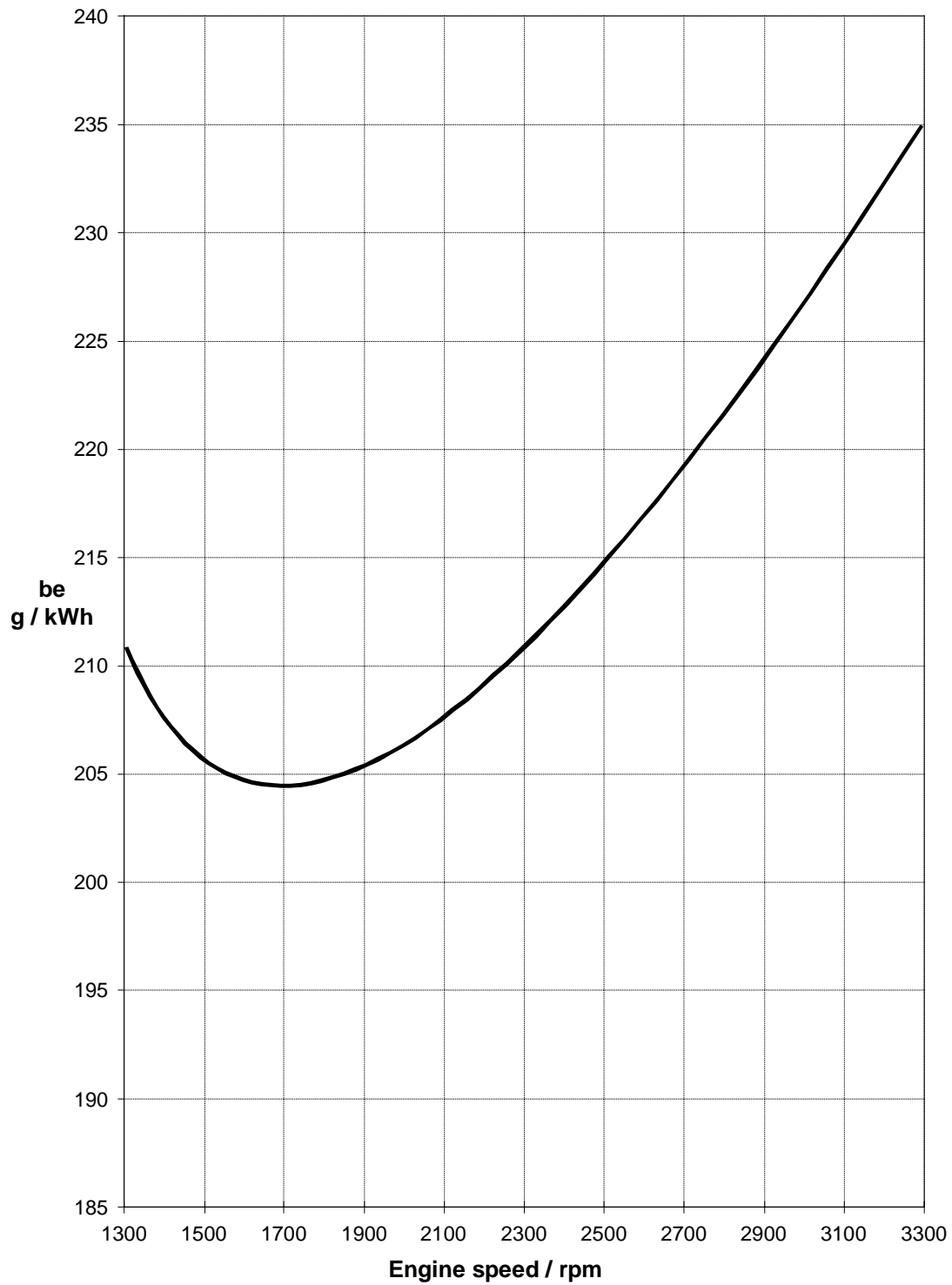
Thermostat

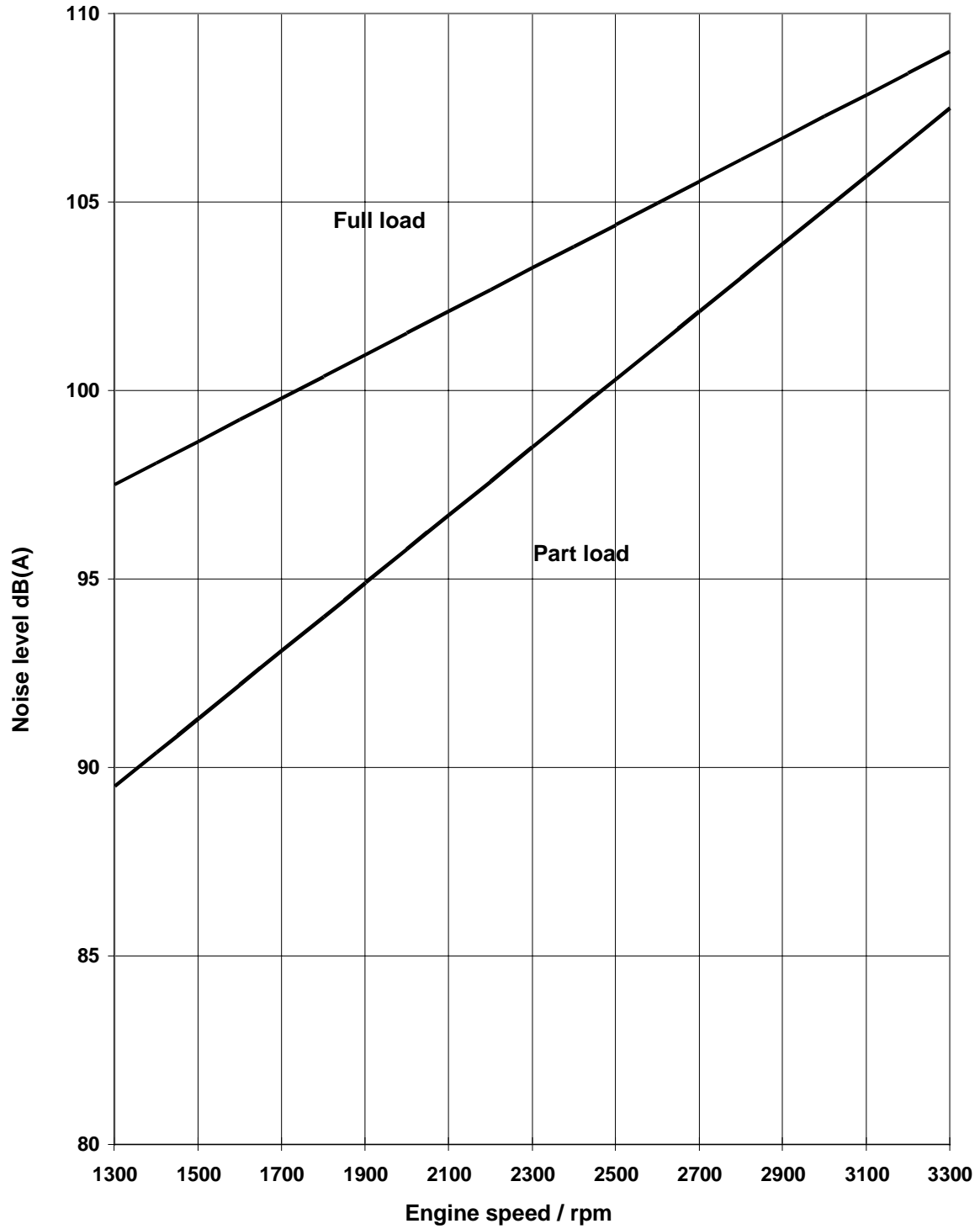
starts opening	°C (°F)	87 (189)
fully open	°C (°F)	102 (216)

Temperature contact switch	°C (°F)	110 ± 3 (230 ± 5)
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Engine oil

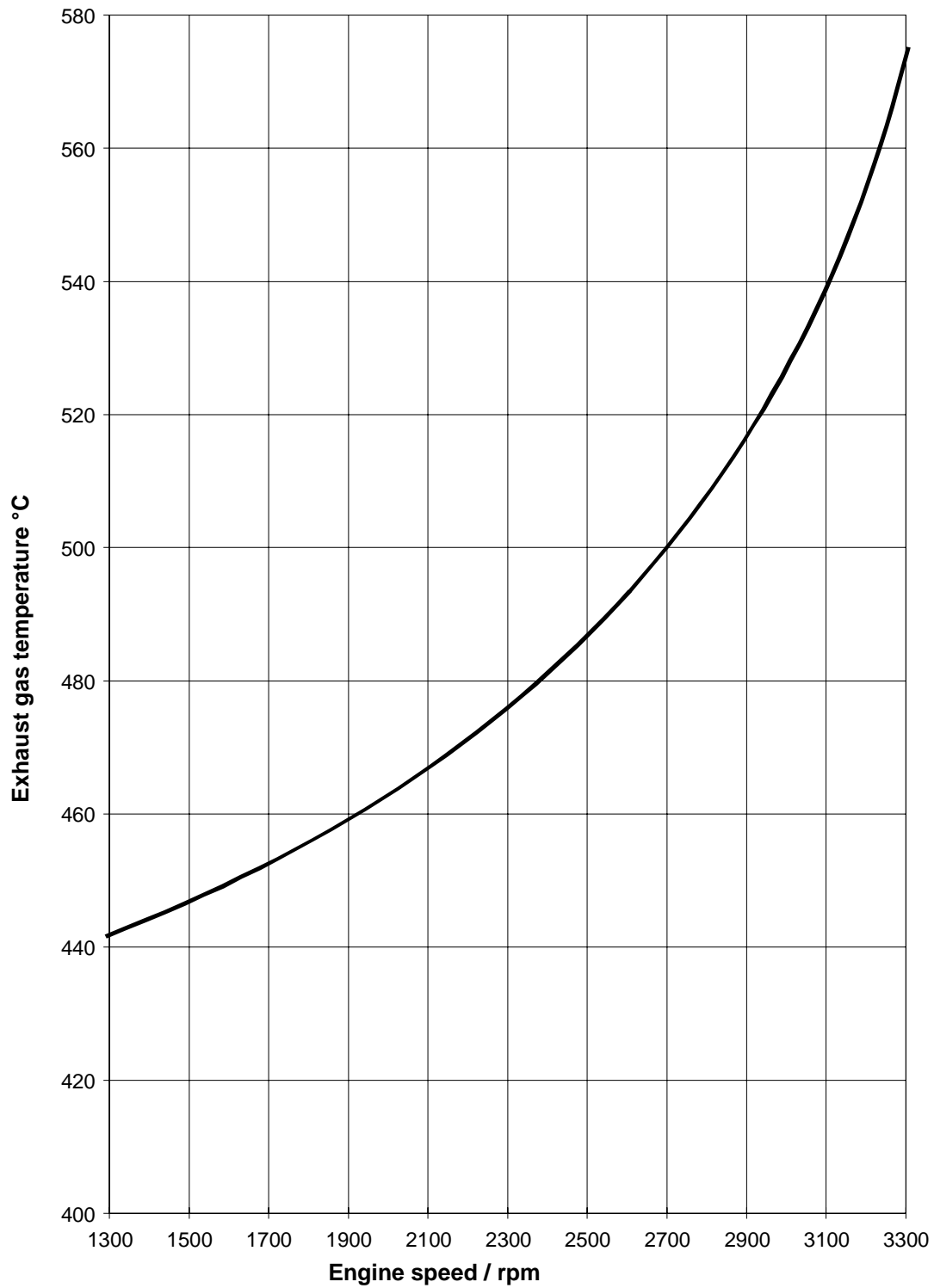
max. perm. temperature in oil sump	°C (°F)	130 (266)
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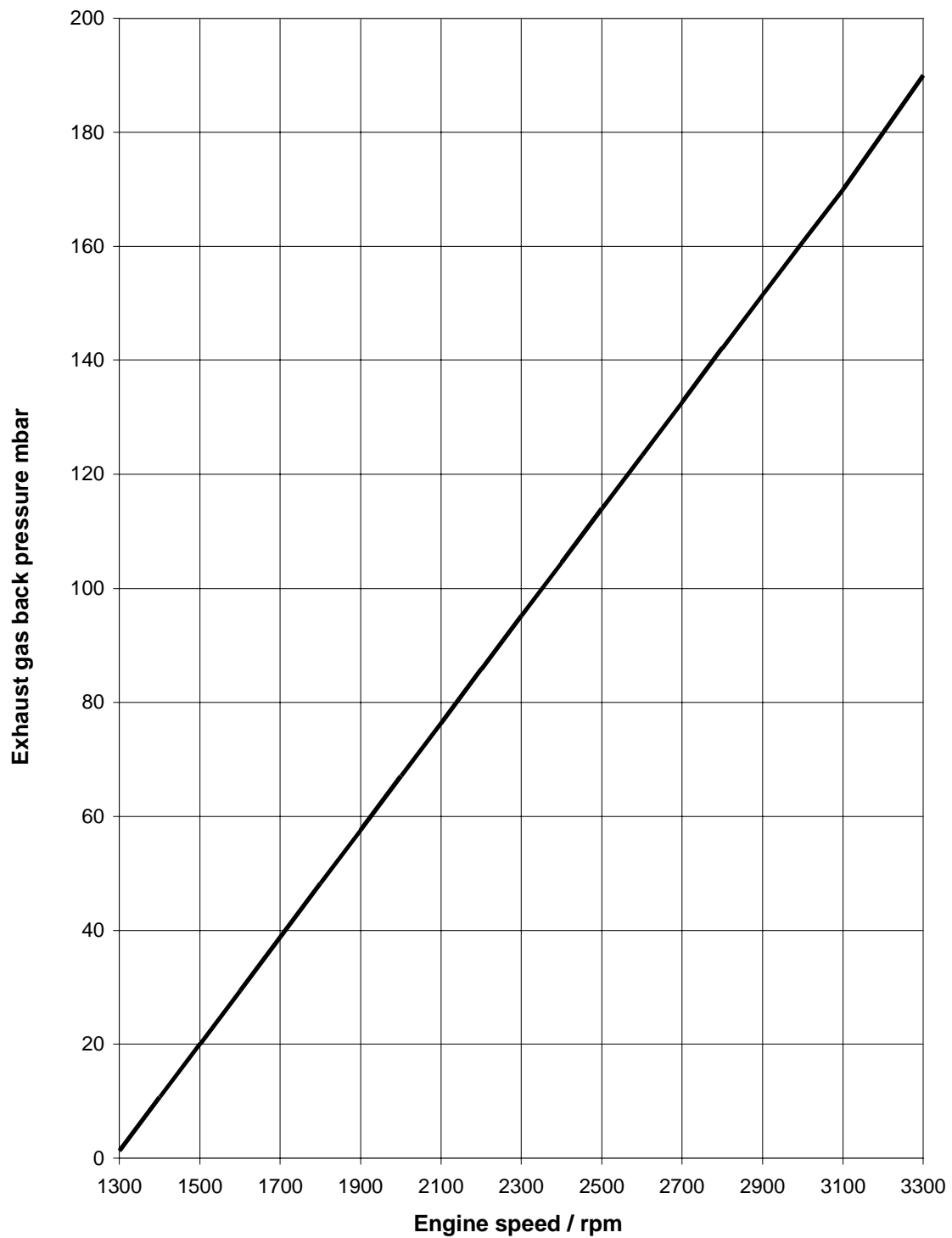


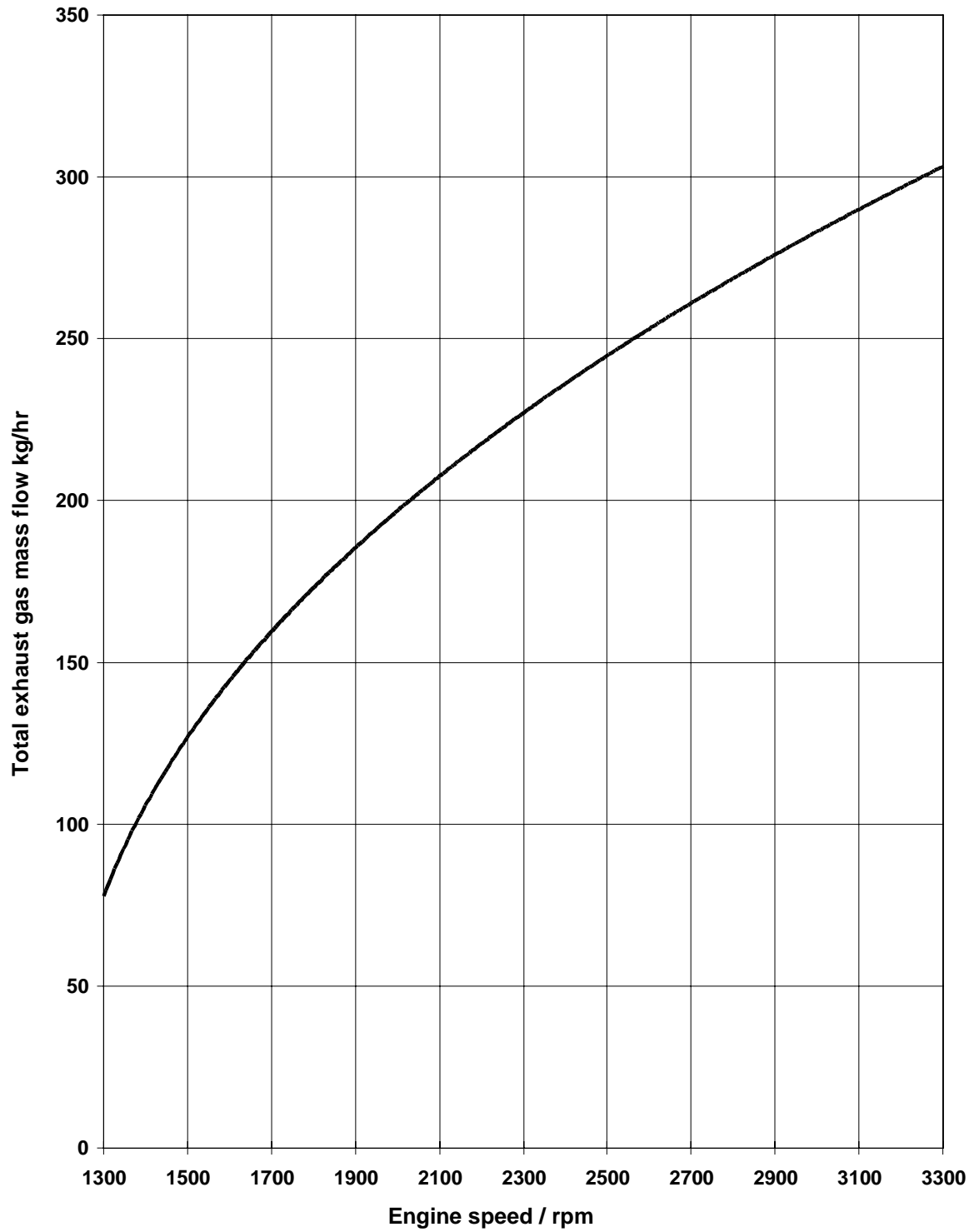


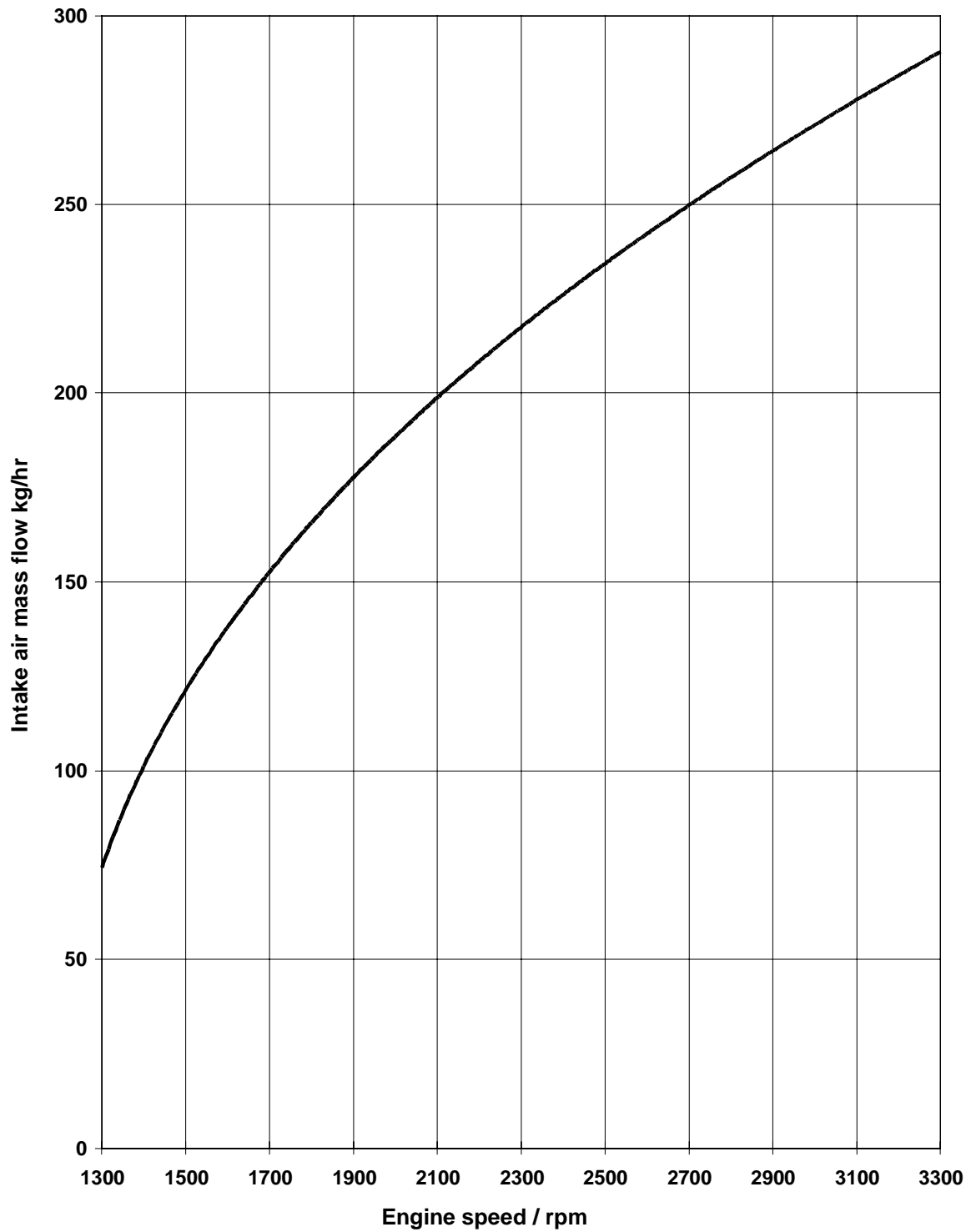


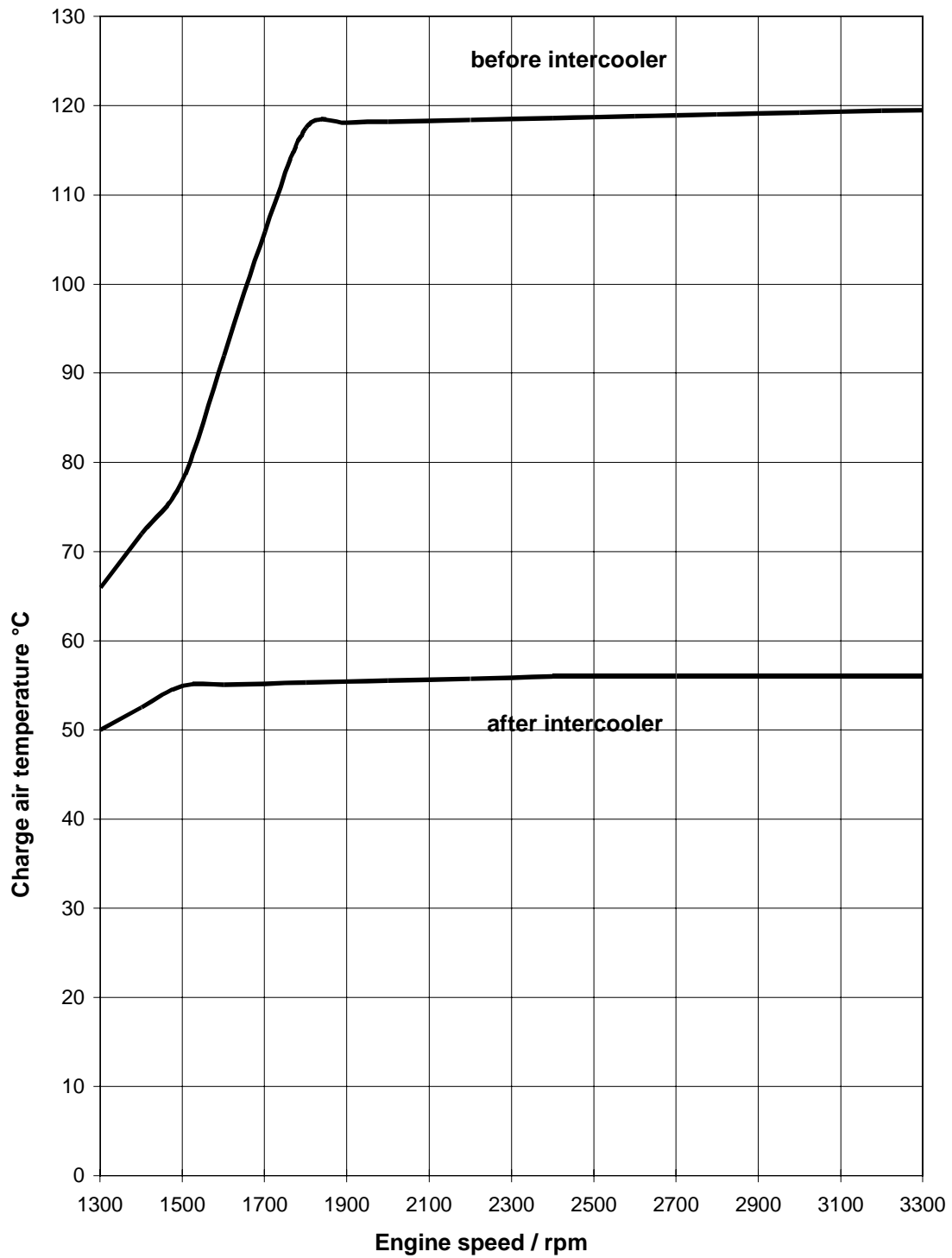
Measuring point: 150 mm after exhaust flange

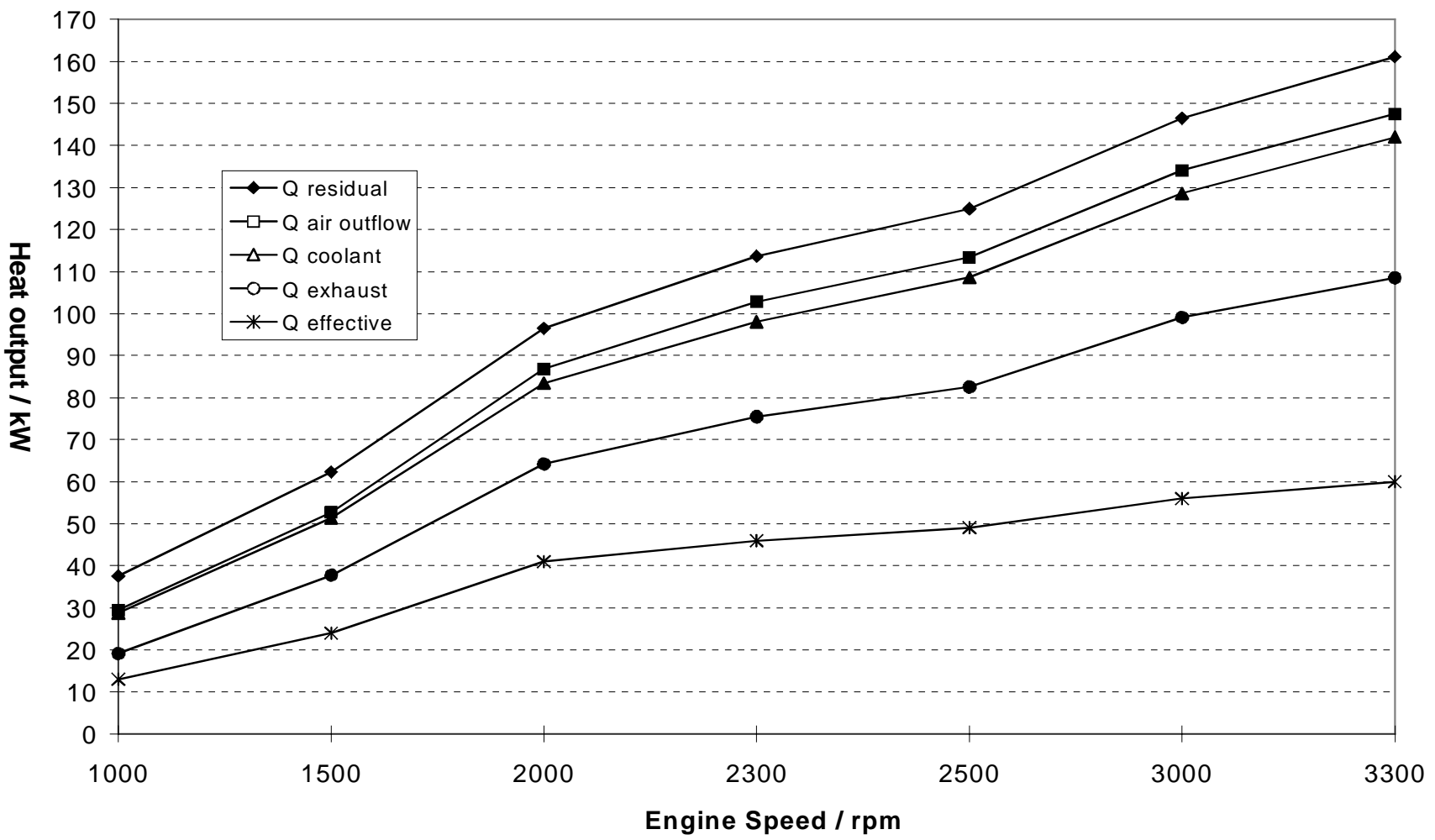












Volkswagen
industrial engine
AFD

Energy balance



Depression values were measured using a Golf A3-TDI-air filter.
TL-VW 848 should be observed when designing an air intake system

