



FLATNESS & SURFACE FINISH

Federal-Mogul Document # 1423

Specification of Mating Surfaces for Gaskets

(English Units)

The following are general specifications that cover both diesel and spark ignition engines. It should be understood that bolt spacing, location of oil and water holes, pressures, etc. will vary ... engine to engine... and there will be exceptions where closer tolerances might well have to be observed to properly seal an engine.

Our suggested specifications follow:

SURFACE FLATNESS*	Maximum Out-of-Flat Amounts	
	<u>Length</u>	<u>Width</u>
3 Cylinder and V6 Engines	.003"	.002"
4 Cylinder and V8 Engines	.004"	.002"
In Line 6 Cylinder Engines	.006"	.002"

- * This is the sum of the values of the cylinder head plus cylinder block combined. Since cylinder blocks usually do not display major out-of-flat conditions, out-of-flat conditions are usually associated with the cylinder head, but the sum of the two must be kept in mind and must not exceed the recommended specification. Maximum out-of-flat of ± 0.001 " (1000 μin) in any 3" diameter should not be exceeded.

SURFACE ROUGHNESS (All values are in microinch - μin)

R_a is average roughness height / R_z is average peak-to-valley roughness height.

Conventional gasket having steel with fiber composite or expanded graphite layers Cast Iron Cylinder Heads or Blocks

Maximum 110 R_a (1000 R_z)

(Rougher surfaces limit gasket conformance)

Minimum 30 R_a (150 R_z)

(Smoother surfaces increase tendency for gasket to flow and reduce the gasket's blow out resistance.)

Recommended range 60-100 R_a (400-800 R_z)

Aluminum Cylinder Heads or Blocks

Maximum 60 R_a (600 R_z)

Minimum 30 R_a (150 R_z)

Recommended range 50-60 R_a (200-600 R_z)

Intake or Exhaust Manifolds (Cast Iron or Aluminum)

Maximum 60 R_a (600 R_z)

Minimum 30 R_a (150 R_z)

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Specification of Mating Surfaces for Gaskets
(English Units) (cont'd)

SURFACE ROUGHNESS (cont'd) (All values are in microinch - μin)

Engine assemblies using the new rubber coated multi-layered steel gaskets:

Heads, blocks & manifolds - CI or AL

Maximum $30 R_a$ ($500 R_z$)

Smoother finishes are desirable.

WAVINESS (see sketch below)

Measurement of waviness requires a special skidless instrument.

The values below, typical of milling machines, should not be exceeded.

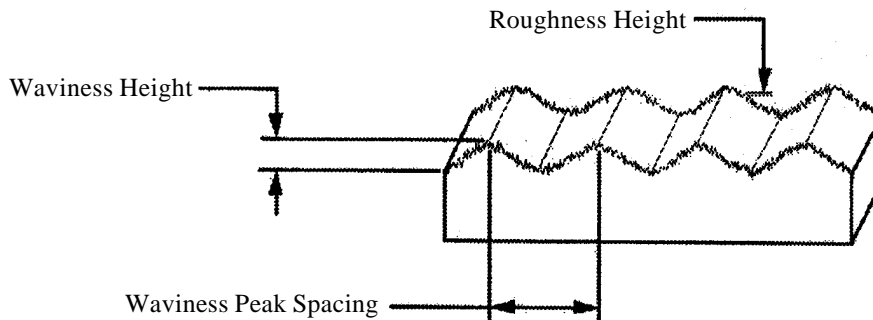
Maximum waviness height (W_t) .0008" (800 μin)

For waviness peak spacing greater than .100"

Maximum waviness height (W_t) .0005" (500 μin)

For waviness peak spacing between .030" - .100"

Waviness peak spacing should be no less than .030".



MISCELLANEOUS INFORMATION

1. There should be no sudden irregularities exceeding .001" (1000 μin)
2. Cleanliness of the mating surfaces and gaskets is of prime importance.
3. "Lay" is the term for the direction or pattern of the surface roughness. All lay patterns (line, arc, cross-hatch) are considered acceptable.