

KES

The Standard of
Etching Time Under
Materials and Etchants

KES T-L035

(EST.) 1988 - 10 - 25

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 **KIA MOTORS**

1. Scope of Application

This standard specifies etching time of the major materials under etchant.

2. Test Apparatus

- (1) Etchant
- (2) Stop watch
- (3) Optical microscope
- (4) Specimen dryer

3. Testing Method

- (1) Sampling
- (2) Polishing
- (3) Etchant selection
- (4) Etchant temperature checking
- (5) Etching
- (6) Drying
- (7) Observing through the optical microscope
- (8) Selecting standard etching time

Cast Irons

Material : FC25

Etchant : Nital 2% solution

Temperature : 11°C

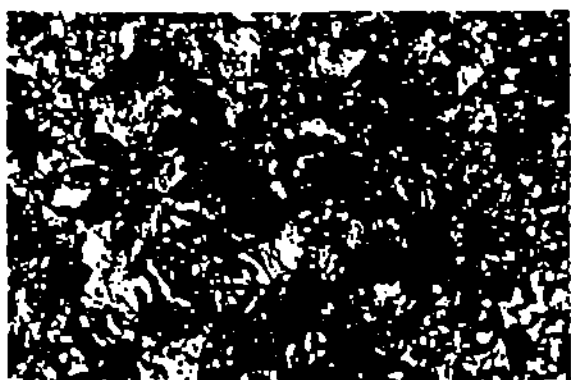


× 100

○ Etching time : 3~7 seconds

○ Test result : not etched

○ Pearlite rarely appeared



× 100

○ Etching time : 15~25 seconds

○ Test result : etched well

○ Graphite flake and pearlite well appeared



× 100

○ Etching time : 50~70 seconds

○ Test result : etched too much

○ Difficult to identify graphite from matrix structure by excessive etching

Material : F CH2

Etchant : Nital 2% solution

Temperature of etchant: 11°C



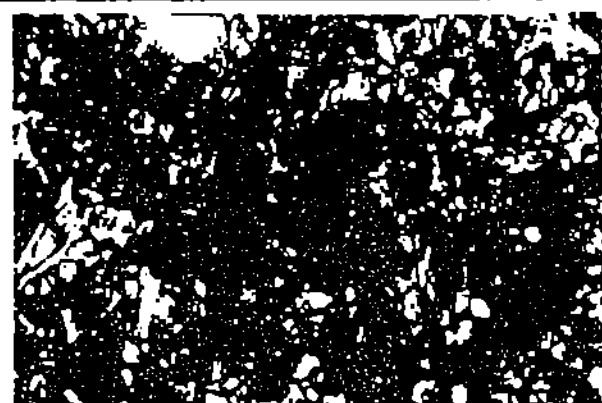
× 100

- Etching time : 3~7 seconds
- Test result : not etched
- Pearlite not appeared



× 100

- Etching time : 15~25 seconds
- Test result : etched well
- Graphite flake and pearlite well appeared



× 100

- Etching time : 35~45 seconds
- Test result : etched too much
- Difficult to identify graphite flake from pearlite by excessive etching.

Material : FCH 5A

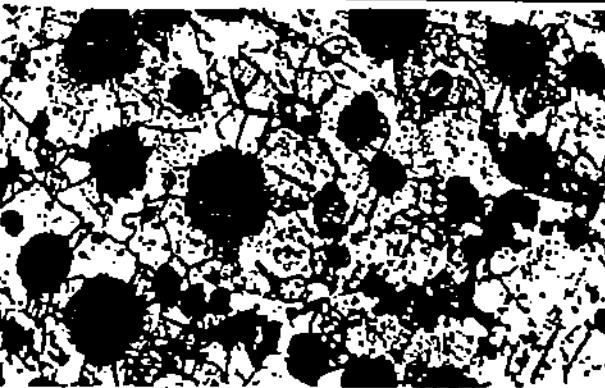
Etchant : Nital 2% solution

Temperature of etchant : 11°C



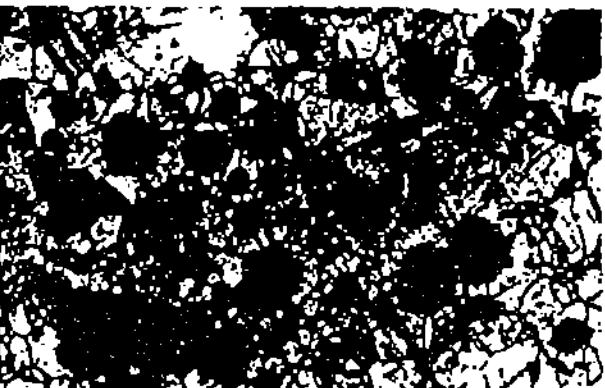
× 100

- Etching time : 3~7 seconds
- Test result : not etched
- Pearlite and steadite rarely appeared



× 100

- Etching time : 15~25 seconds
- Test result : etched well
- Pearlite and steadite well appeared



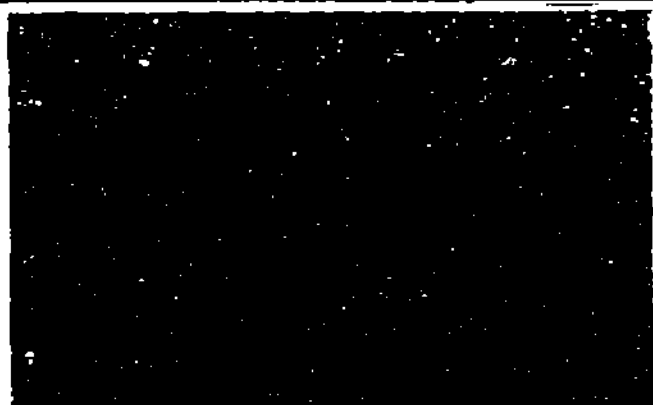
× 100

- Etching time : 55~70 seconds
- Test result : etched too much
- Difficult to identify graphite flake from pearlite by excessive etching and the steadite boundary.

Material: FCD 45A

Etchant: Nital 2% solution

Temperature of etchant: 11°C



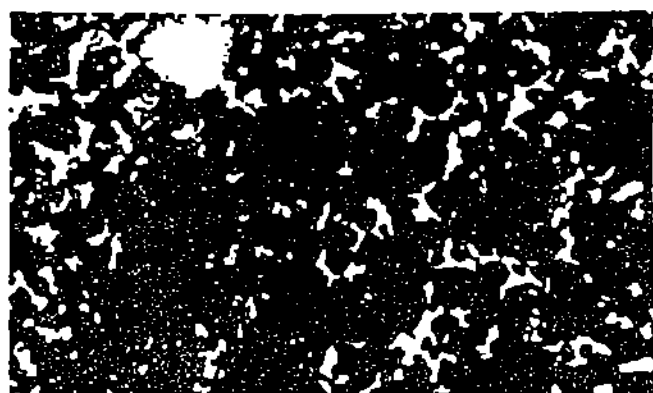
× 100

- Etching time : 5~15 seconds
- Test result : not etched
- Ferrite boundary rarely appeared



× 100

- Etching time : 45~55 seconds
- Test result : etched well
- Ferrite boundary well appeared



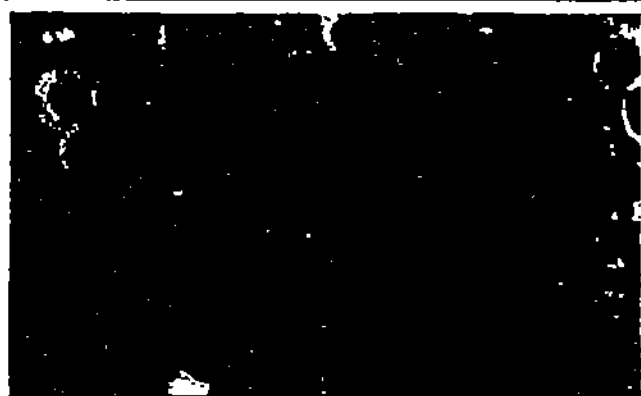
× 100

- Etching time : 90~100 seconds
- Test result : etched too much
- Excessive etching near ferrite boundary and graphite.

Material : FCD 4 5F

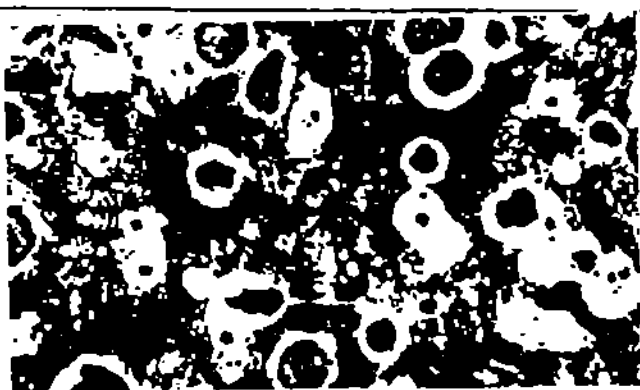
Etchant : Nital 2%

Temperature of etchant : 11°C



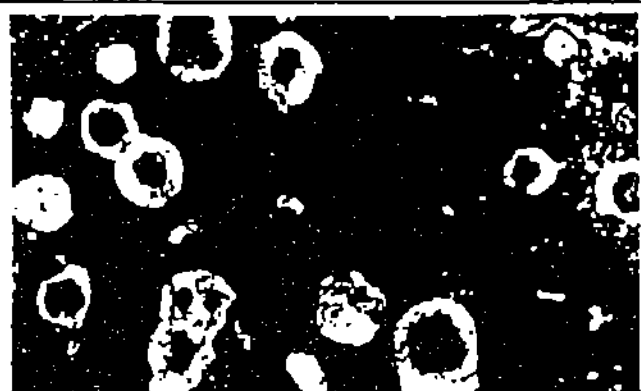
× 100

- Etching time : 5~15 seconds
- Test result : not etched
- Pearlite and ferrite boundary rarely appeared



× 100

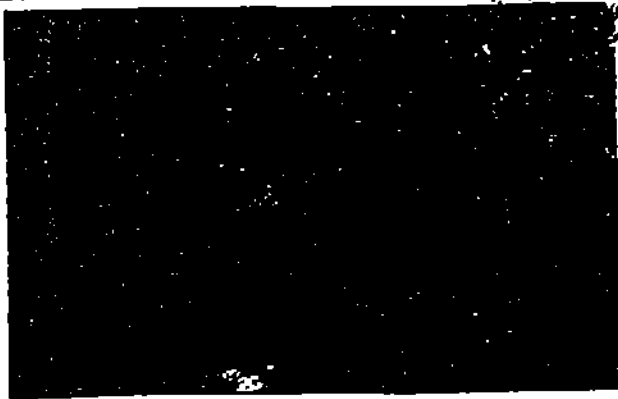
- Etching time : 45~55 seconds
- Test result : etched well
- Pearlite and its boundary well appeared



× 100

- Etching time: 70~100 seconds
- Test result: etched too much
- Pearlite and its boundary etched too much.

Material : FCD 55F
 Etchant : Nital 2% solution
 Temperature of etchant: 11°C



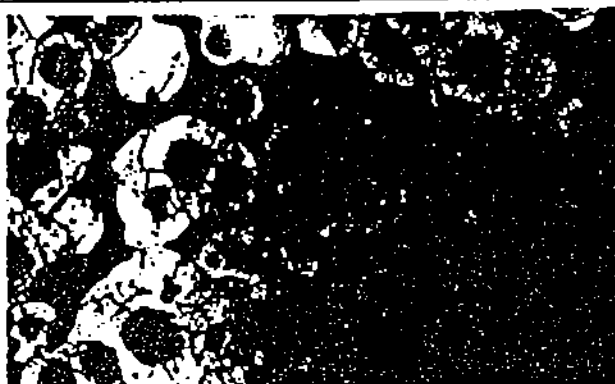
× 100

- Etching time : 3~7 seconds
- Test result : not etched
- Pearlite and its boundary rarely appeared



× 100

- Etching time : 30~40 seconds
- Test result : etched well
- Pearlite and its boundary well appeared



× 100

- Etching time: 80 seconds or more
- Test result: etched too much
- Layered pearlite not appeared by too much etching even with the high magnification