ASPECTS OF COMMUTATOR / SLIP RING FILMS

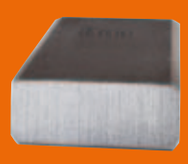
MAINTENANCE

SUITABLE FILMS

COLOR INTENSITY

P2

P6

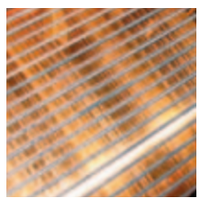


FF2

Correct film deposit
Uniform, light brown (P2) to darker brown (P6).
The machine and the carbon brushes work well.
Corresponding carbon brush contact surface: FF2 (homogeneous, uniform surface)

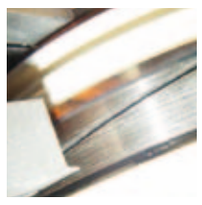
SUSPECT FILMING REQUIRING MONITORING

FILM ASPECTS

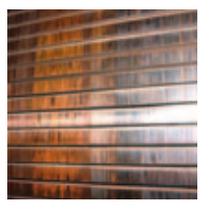


P12

P14a



P14b



P16

FF14

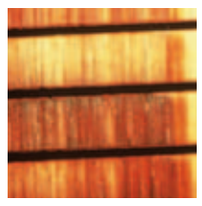
- P12: Streaky film
  Lines or bands of varying width, alternating light and dark, without copper wear.
  Most frequent causes: excess humidity, oil vapors or aggressive gases in the atmosphere, underloaded carbon brushes.

- P14: Raw grooved film
  P14a: on commutator / P14b: on slip ring
  Same as for P12, but with copper-colored raw grooved bands or very lightly colored bands. The metal is being attacked.
  Most frequent causes: same as for streaky film, but worsened or longer-lasting. Also the carbon brush grade may be unsuitable.
  Corresponding carbon brush contact surface: FF14 (streaky surface)

- P16: Patchy film
  Showing spots of various shapes, colors and dimensions, without any pattern.
  Most frequent causes: deformed or dirty commutator, out-of-round slip ring.

PATCHINESS DUE TO MECHANICAL CAUSES

P22



P24

FF24

P26

P28

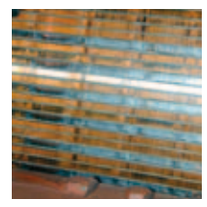
FF26

- P22: Uneven film
  "Screw thread" effect.
  Most frequent cause: bad commutator machining during a maintenance operation (chattering tool).

- P24: Dark in patches
  Patches often followed by lighter faded patches.
  Most frequent cause: defect affecting one bar or a group of bars, and making the carbon brush bounce.
  Corresponding carbon brush contact surface: FF24 (chipped edge)

- P26 - P28: Dark patches in the middle or on the edges
  Shading in the middle of the bars (P26) or at the two bar edges (P28).
  Most frequent cause: poor maintenance of the commutator.
  Corresponding carbon brush contact surface: FF26 (pitted surface)

BAR MARKING DUE TO ELECTRICAL CAUSES



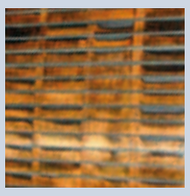
P42

P44

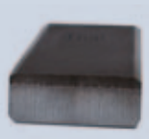
- P42: Alternate bars of light and dark
  Surrounded by a variable number of light bars, the dark bars have a polished, mat or blackened appearance.
  This pattern is repeated all around the whole commutator.
  The most frequent causes are of an electrical origin. They appear on armatures with more than one conductor per slot, and are linked with successive and increasingly difficult commutation of each successive conductor in the slot.

- P44: Pitting - strong spark marks
  Most frequent cause: high frequency current flow or bad sliding of one of several carbon brushes in their holders.

BURNING

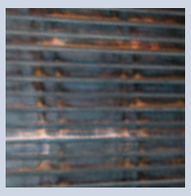


B6



FF6

B8



B10

- B6: Spark burns at bar edges
  Burning marks more or less severe.
  Corresponding carbon brush contact surface: FF6 (burnt edge or surface)

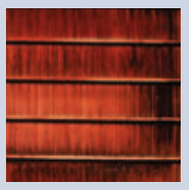
- B8: Burning at center of bars
- B10: Pitted film
  Variable number of small light patches randomly spread on a normal filmed track.

Most frequent cause: sparking under the carbon brushes.

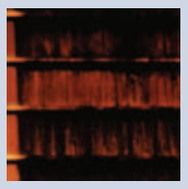
MARKING

T10

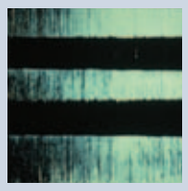
T11



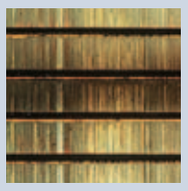
T12



T14



T16



T18

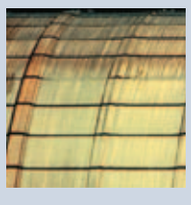
P62

Particular types:

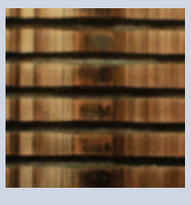
- T10: Brush image on commutator (ghosting)
- T11: Brush image on slip ring (ghosting)
  Dark or black mark reproducing the carbon brush contact surface on the commutator / slip ring.
  Most frequent causes: accidental overload or electrolytic mark during a long period of stoppage.

- T12: Dark fringe due to high bar L2
- T14: Dark fringe due to low bar L4
- T16: Dark fringes due to high mica L6
- T18: Dark local patches due to burs L8
- P62: Patches due to pollution, strong presence of deposits (oil, grease) on the film
  Most frequent cause: carbon brush contaminated during maintenance operation.

COMMUTATOR BAR WEAR



R2



R4

- R2: Commutator with axial profile showing metal wear on each track in spite of correct stagger. This wear may appear after a very long period of operation.

- R4: Commutator showing abnormal wear of the metal due to incorrect axial stagger, unsuitable carbon brush material, various pollutions...

COMMUTATOR BAR FAULTS

- L2: high bar
- L4: low bar
- L6: high mica
- L8: burs at bar edges
- L10: copper drag

L2 L4 L6 L8 L10

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