Cutting and analysis of spread from the cut of painted samples

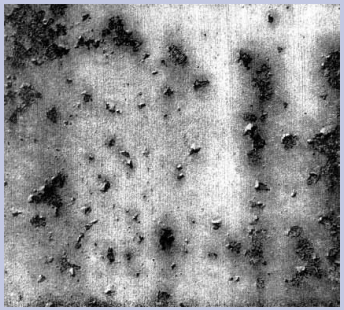
Standard for evaluation of degradation

- EN ISO 4628 Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance
  - Part 3 Assessment of degree of rusting
  - Part 5 Assessment of degree of flaking
  - Part 8 Assessment of degree of delamination and corrosion around a scribe
  - Part 10 Assessment of degree of filiform corrosion

Part 3. Degree of rusting and rusted area

Degree of rusting	Rusted area %
Ri 0	0
Ri 1	0,05
Ri 2	0,5
Ri 3	1
Ri 4	8
Ri 5	40 to 50

Ri 2

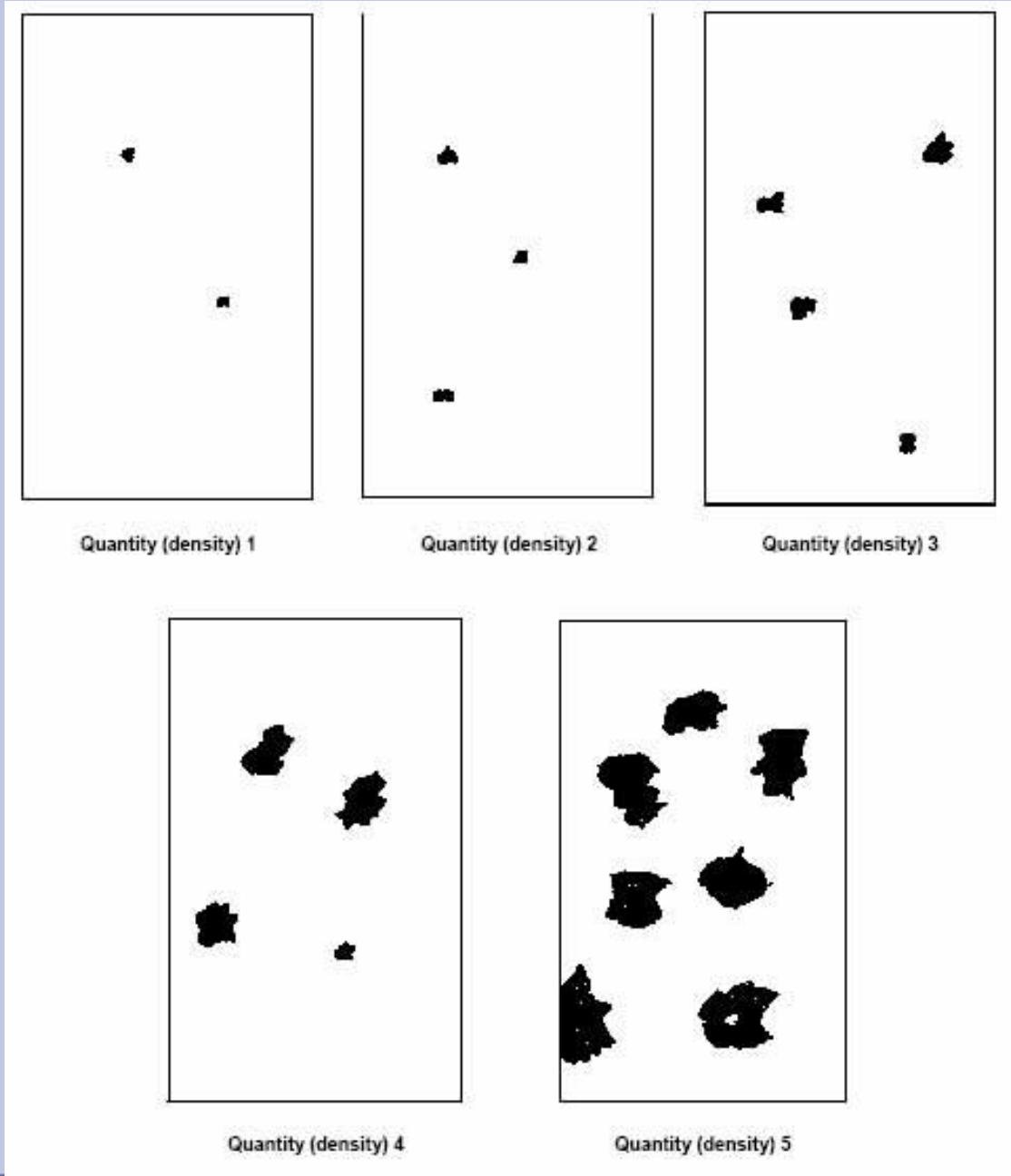


Ri 4

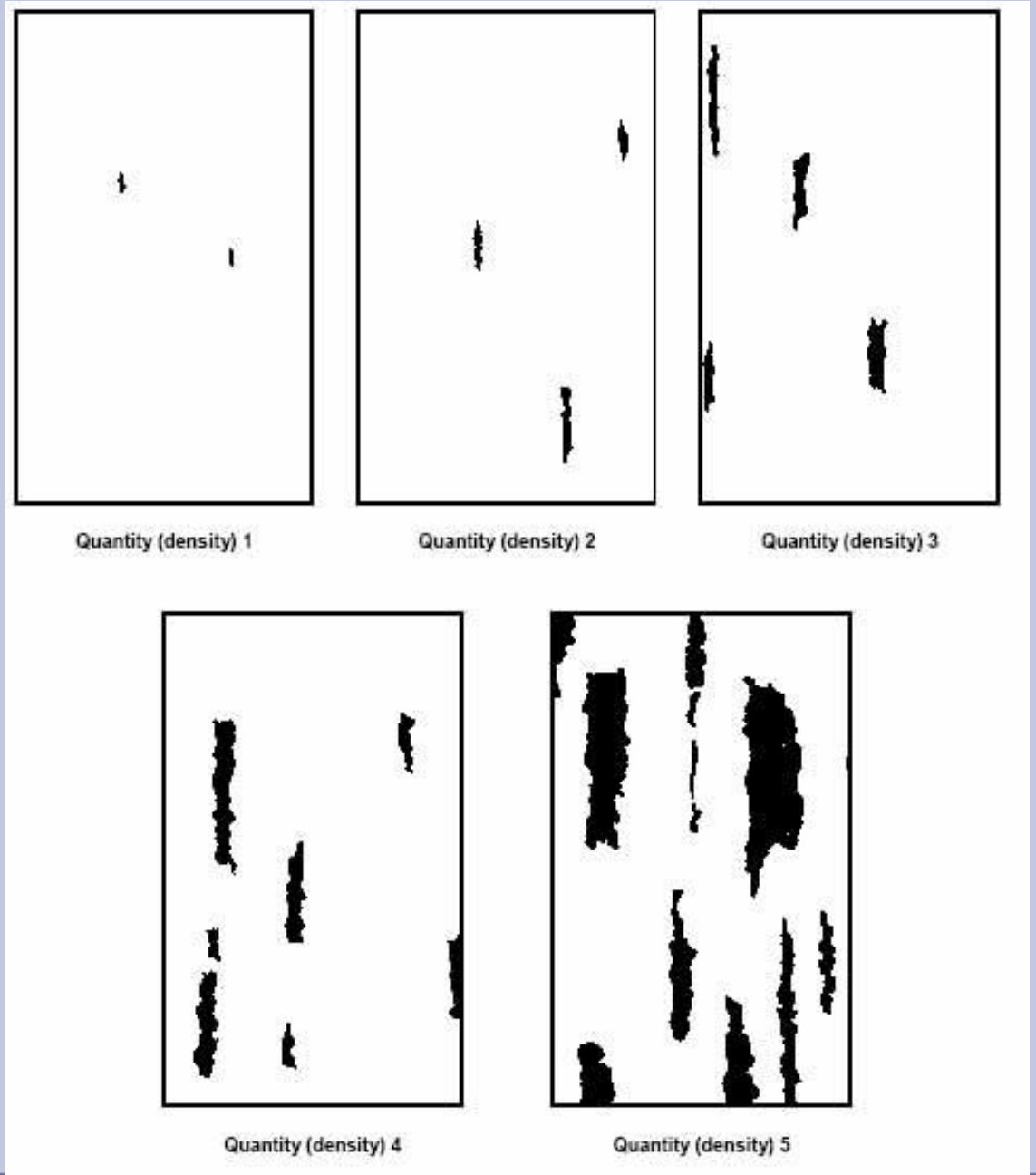
Part 5. Designating the quantity of flaking

Rating	Flaked area %
0	0
1	0,1
2	0,3
3	1
4	3
5	15

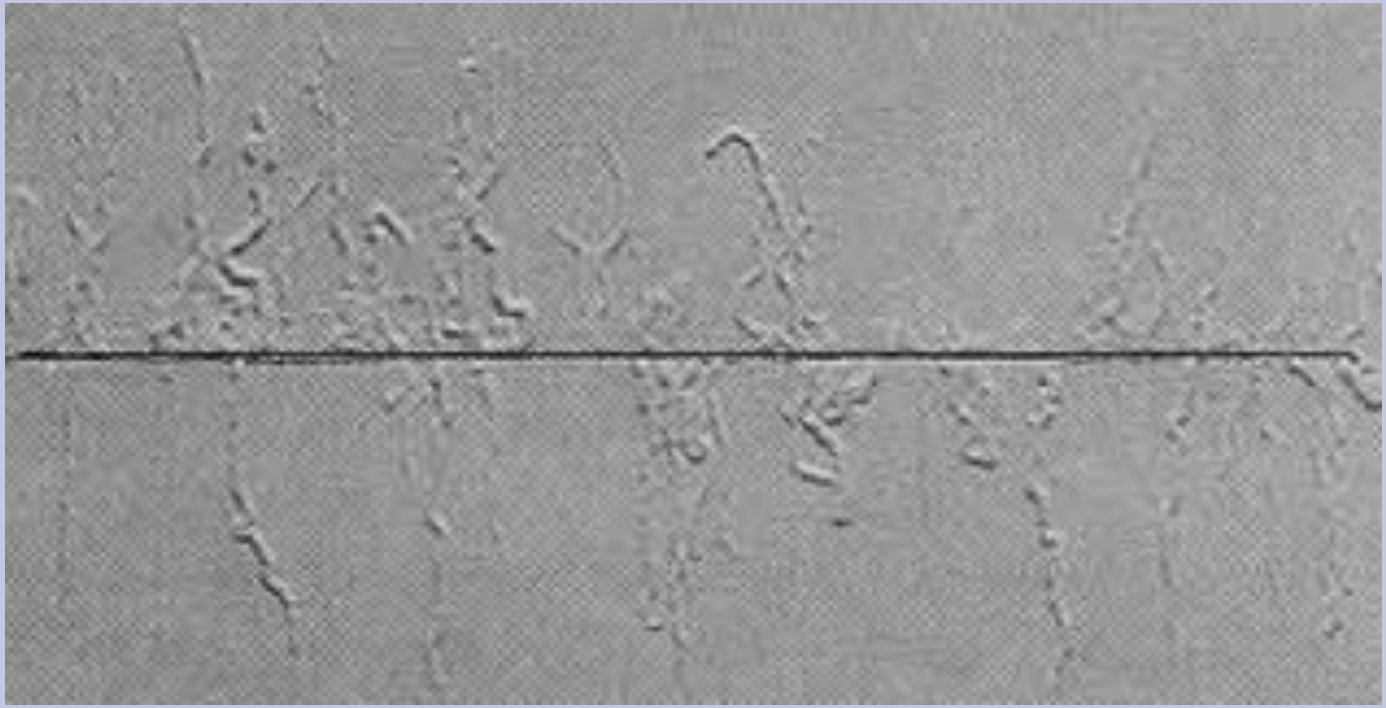
Flaking without preferential direction



Flaking with preferential direction



Part 10. Filiform corrosion



Evaluation of filiform corrosion

- Two parameters are determined based on the spread from both sides of the scratch
  - The length of the longest filament (L)
  - The most frequent filament length (M)

- For determination of M, two methods are proposed
  - Method 1 (for regular filiform corrosion, a)
  - Method 2 (for irregular filiform corrosion, b)

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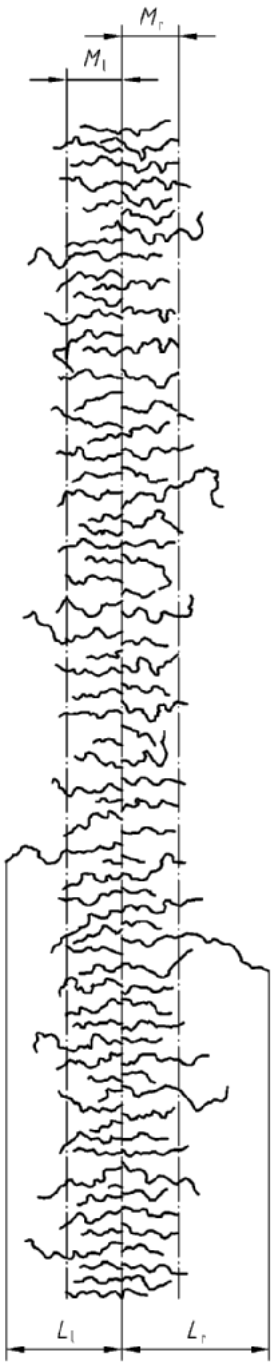
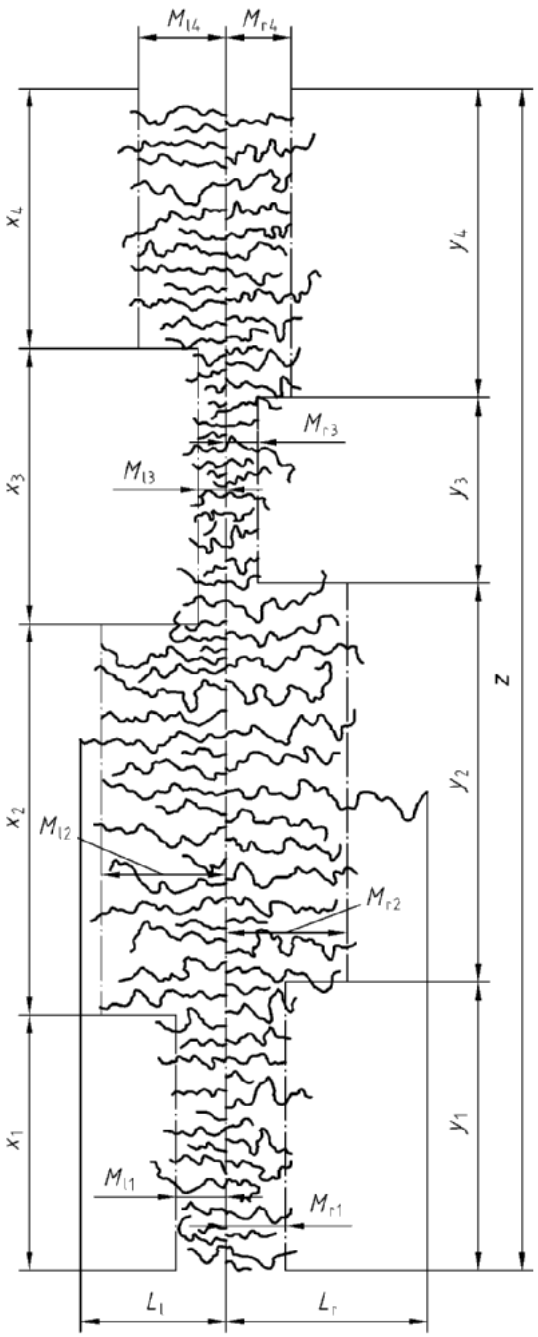
Evaluation of filiform corrosion Figure 1a&b

Key

L	length of longest filament
M	most frequent filament length
r	right
l	left
1, 2, ...	number of zone
x	zones on left-hand side
y	zones on right-hand side
z	overall length of assessed area



a)



b)

Expression of results for filiform corrosion

- The numerical ratings for the length of the longest filament *L* and the most frequent filament length *M* should be expressed as in the following example:

filiform corrosion, *L*5/*M*3

- This means the length of the longest filament is 5 mm and the most frequent filament length is 3 mm.

Part 8. Delamination and corrosion around a scribe

- The following phenomena can occur around the scribe:
  - **Corrosion**, area of visible corrosion products
  - **Delamination**, loss of adhesion of a coating

- Both the area of delamination and the area of corrosion are determined either by
  - Measurement and calculation (preferred) or;
  - (Pictorial standards)

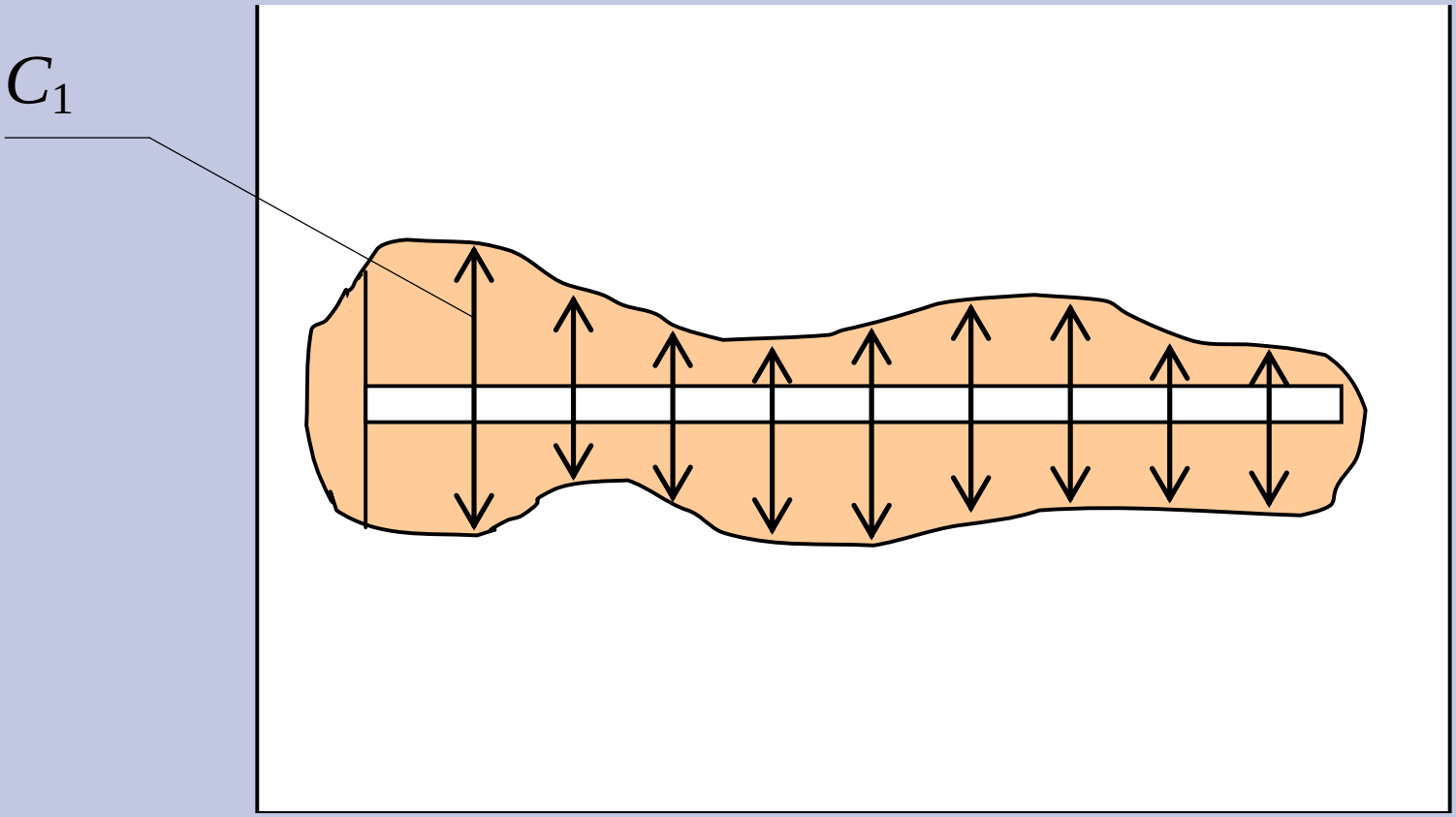
Assessment of delimation

- Carefully remove any loose coating using a knife and lifting the coating away from the substrate
- Measure, in mm, the total width of the zone of delamination at a minimum of six points uniformly distributed along the scribe. Ignore delamination beyond the beginning and end of the original scribe
- Determine the arithmetic mean and record this as the mean overall width of the zone of delamination, d_1

Assessment of corrosion

- Carefully remove any loose coating using a knife and lifting the coating away from the substrate
- Measure, in mm, the total width of the zone of corrosion at a minimum of six points uniformly distributed along the scribe. Ignore corrosion beyond the beginning and end of the original scribe
- Determine the arithmetic mean and record this as the mean overall width of the zone of corrosion, w_c

Determination of arithmetic mean



Calculation and expression of results

- Degree of delamination in mm, d

  $d = (d_1 - w) / 2$

- Degree of corrosion in mm, c

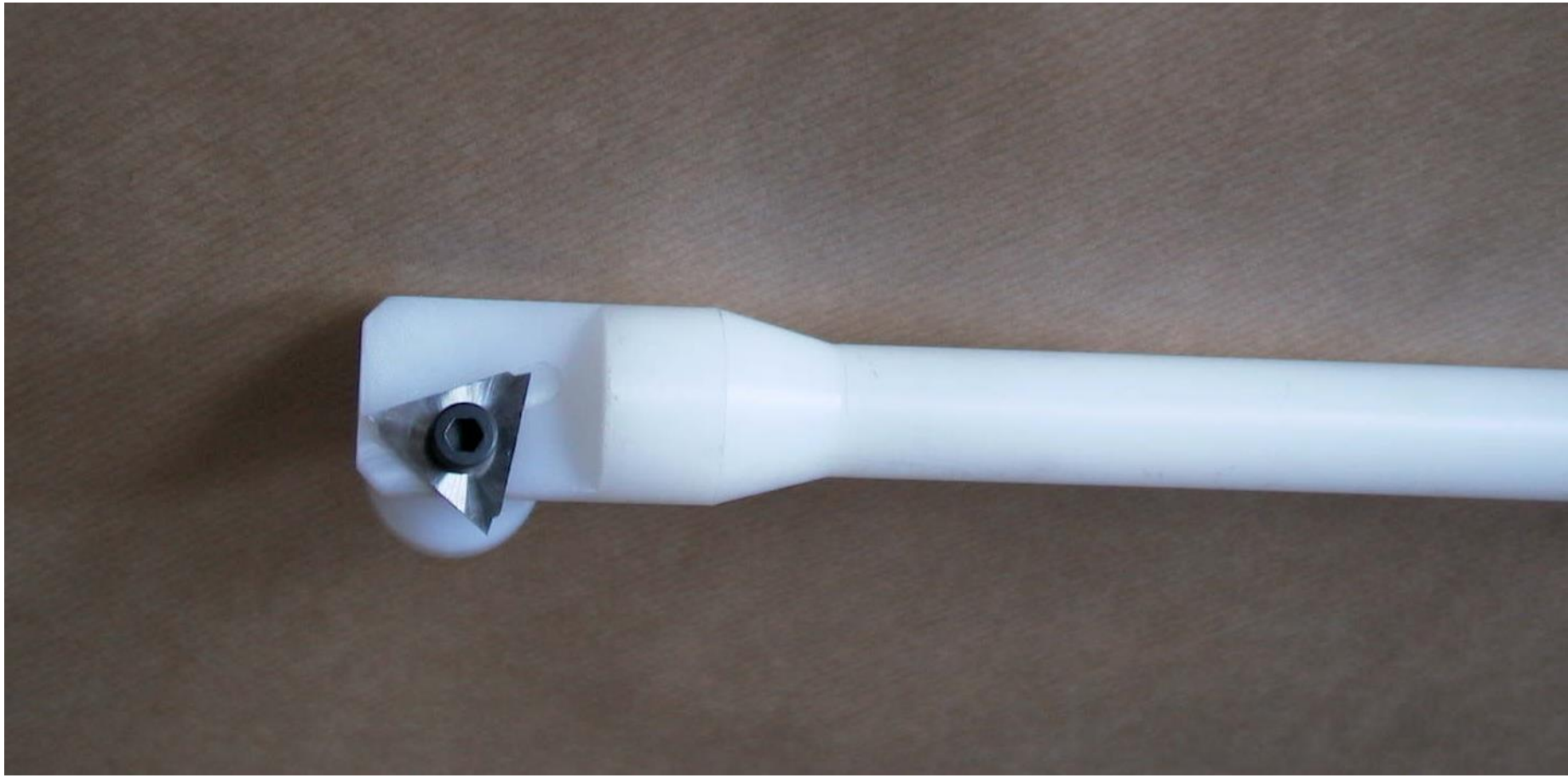
  $c = (w_c - w) / 2$

- w, width of the original scribe in mm
- d_1, mean overall width of the zone of delamination in mm
- w_c, mean overall width of the zone of corrosion in mm

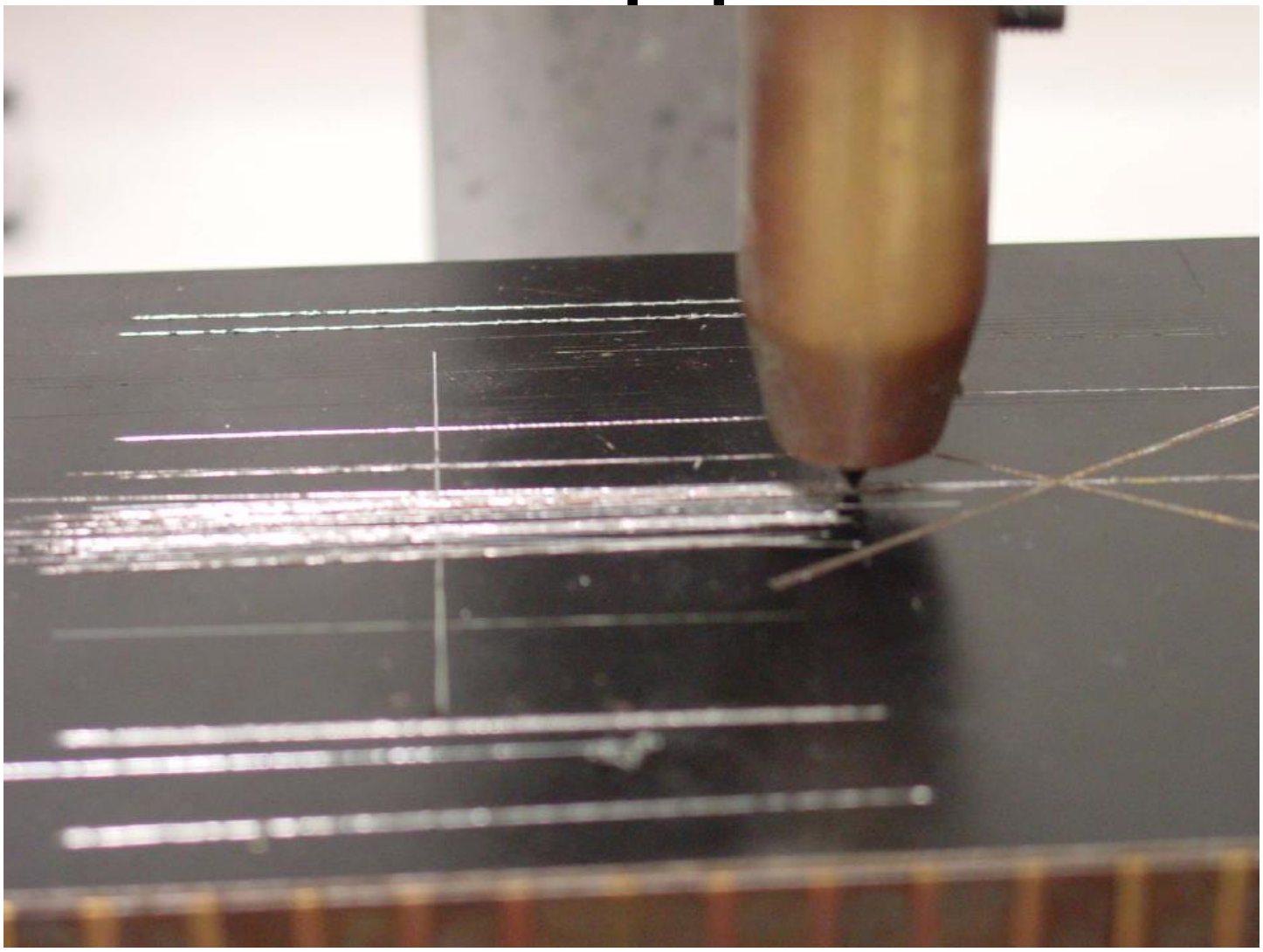
Tools for making a scribe

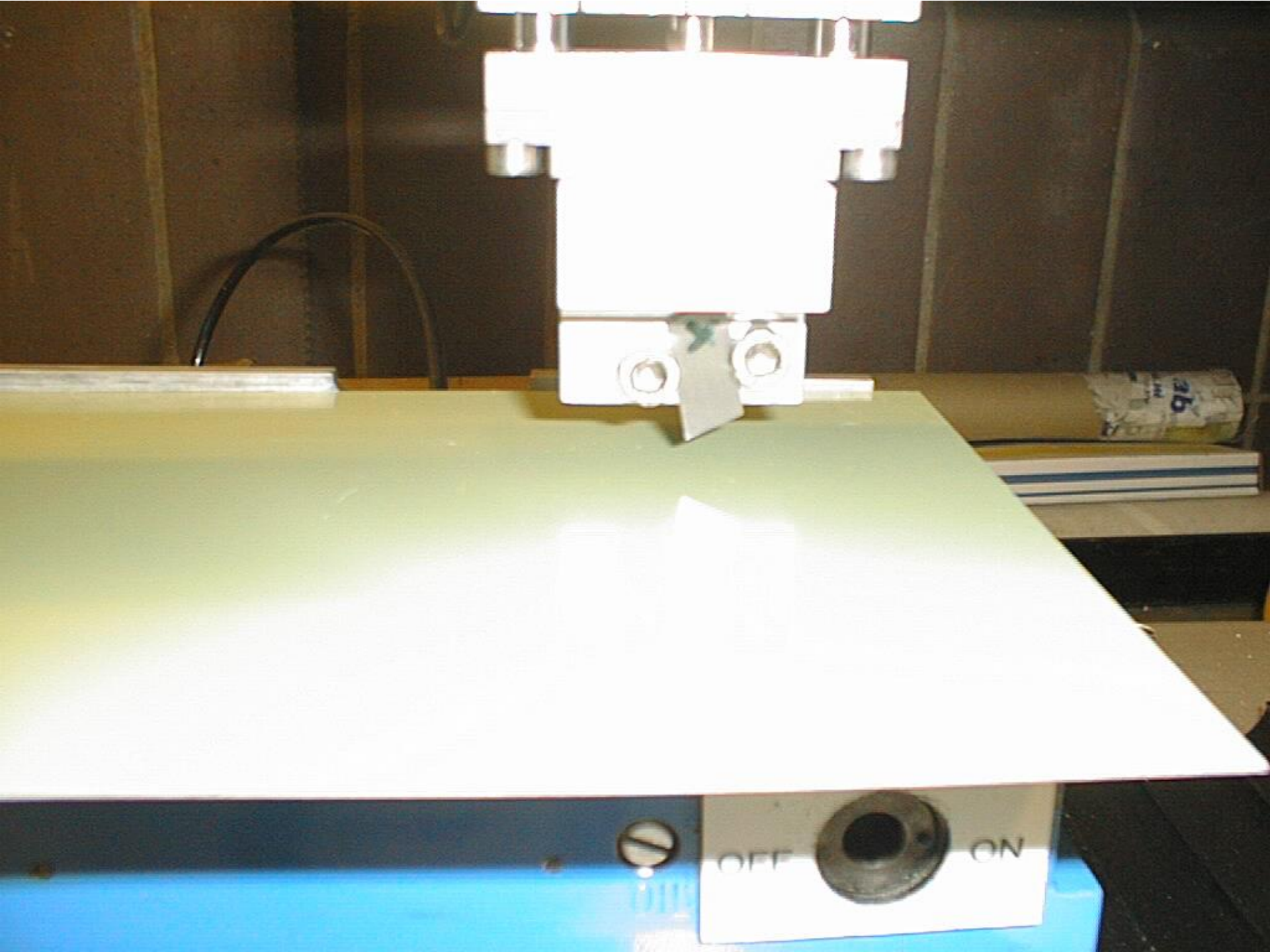
Manual tool (sharp tip)

Manual tool (Volvo scribing tool)



Automatic equipments




OFF
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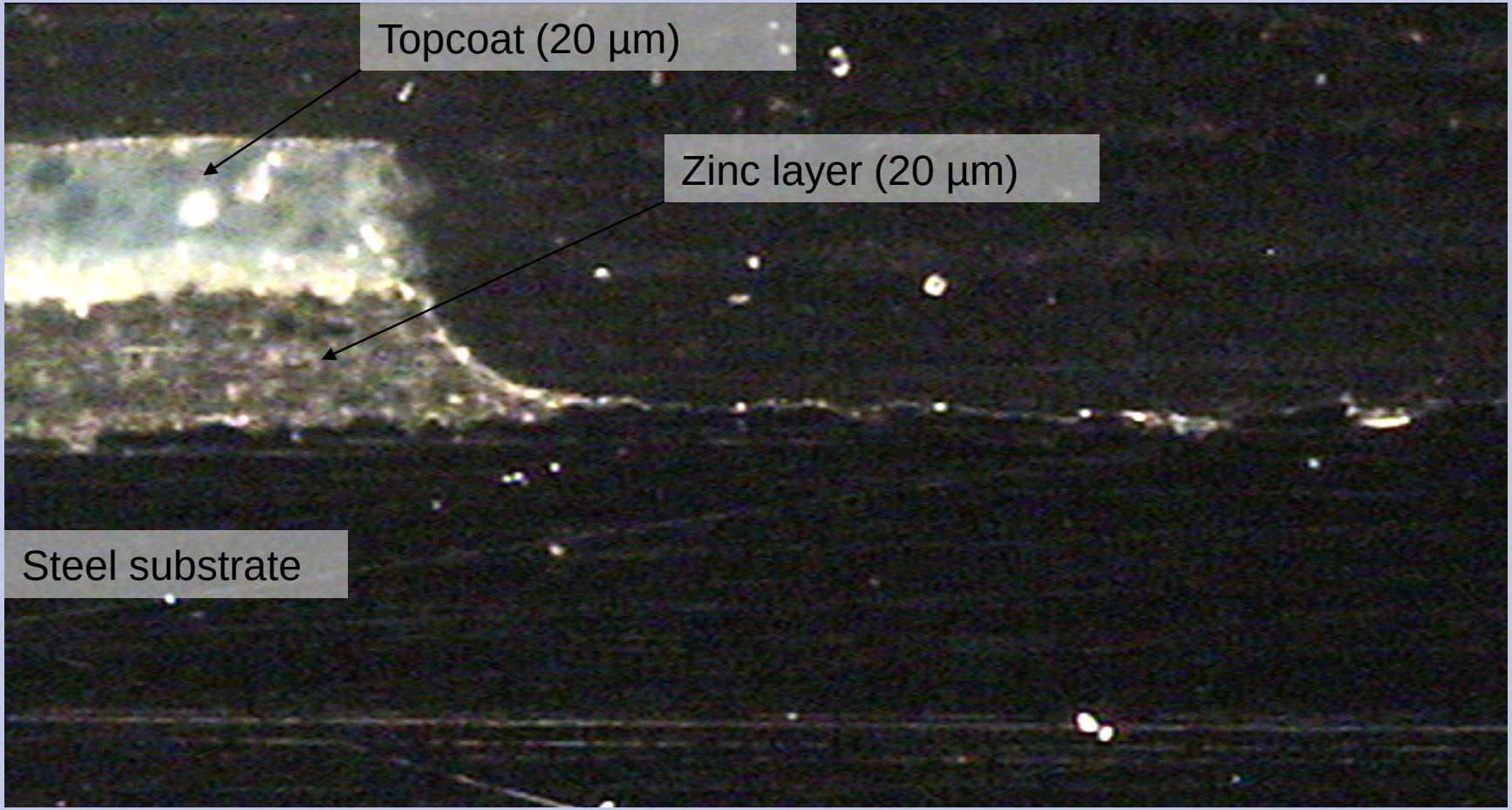
Example of a scribe produced in a correct way



Example of a scribe produced in an incorrect way

- Damage is present outside the scribe produced by a singly stroke before testing
- Scribe must be made without causing mechanical damage in the surrounding coating
- This is avoided by repetitive scribing applying less force

General recommendation

- Scribe is made through the coating and through any anodic layers to the steel substrate by multiple strokes with a perpendicular edge type scribing tool