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GELSENKIRCHEN - HORST
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DIRECTIONS FOR ASSEMBLING AND ISSUING "SPOT" OUTFITS AND "SPOT" ACIDS

1) The spot test outfit is placed in a wooden box and consists of the following:

- 250 ml glass bottles for the spot test acids (S₃, N₅, N₆, N₇)
- 1 Standard for each of the materials S₁, S₂, N₃, N₄, N₇, N₈
- 1 clean piece of cleaning cloth
- 1 direction for the use of the outfit
- 1 list of contents of the outfit

The glass bottles should be fitted out as dropping bottles, to permit applying small drops without the use of any droppers or glass rods to the material to be tested.

The standards must be distinctly marked.

2) The spot test acids have the following composition:

- S₃ = 1 part sulfuric acid + 1 part distilled water
- N₅ = 5 parts nitric acid + 1 part distilled water
- N₆ = 5 parts nitric acid + 3 parts distilled water
- N₇ = 1 part nitric acid + 2.5 parts sulfuric acid + 2 parts water

All the acid used must be chemically pure. HNO₃, Sp. gr. 1.4; H₂SO₄, Sp. gr. 1.84. The proportion of the constituents must be maintained to within ± 3%.

Directions 1. The use of the Spot Test outfit and the Characteristics of the Different Grades of Steel.

1. The material to be tested must be metallically pure at the spot tested. For this purpose it is polished or filed with a clean file. The polishing stone used must always be well cleaned, to keep it free from adhering particles of material. Under no conditions must any oil or dirt be permitted to remain on the spot test. A small drop of the spot test acid is placed upon the spot tested, using the dropping arrangement of the acid flask, and a careful observation is made whether the acid does attack the spot and how the attack progresses. Two tests are foreseen for every grade of steel (except N₇) one of which is positive, the other negative.

2) The different grades of steel have the following characteristics:

- S₁
 - a) Spot test with the acid (N₆): the drop effervesces and is brown.
 - b) The Brinell hardness test: the hardness obtained H 10/3000/30: 139 to 167.
- S₂
 - a) Spot test with acid (N₆): the drop becomes brown with effervescence.
 - b) Brinell test hardness H = 10/3000/30 = 111 to 125.
- S₃ (Copper-containing steel from Dortmund)
 - a) Spot test with acid (N₆) causes the drop to become dark brown with effervescence.
 - b) Spot test with acid (S₃): drop remains clear.

NO₃ a) Spot test with acid (N₆): the drop turns black with effervescence.
b) Brinell hardness, H 10/300/30: 200 to 229.

NO₄ a) Test spot with acid (N₆): effervesces and black coloration.
b) Brinell hardness, H 10/3000/30: 229 to 257.

N₅ a) Spot test with acid (N₆), the drop effervesces brown for a moment (Flash) and becomes light with a gray background.
b) Spot test with acid (N₆) the drop remains light, no action.

N₆ a) Spot test with acid (N₇), the drop brown, effervesces.
b) Spot test with acid (N₆), the drop remains light, no action.

N₇ Spot test with acid (N₇) the drop remains light no action.

N₈ a) Spot test with the acid (N₆): the drop effervesces brown for a short time and becomes light with a dark background.
b) Spot test with acid (N₆) the drop remains light with a light gray background.

In cases of doubt a spot test is made for comparison on a standard piece in the box. The course of the attack must be particularly closely observed with N₅ and N₆. The hardness of N₅ is 129 to 137, of N₆ - 185 to 229.

1. Directions for Spot-Testing.

1) Each week (on Mondays) the spot test acids of the spot test outfit in use must be tested. The testing is done by spot-testing the standard pieces with the corresponding acids. Should some acids fail to work, it must be removed. Residues and sediments must be removed from the acid in the flasks.

At the same time the standards must be examined, and if necessary re-polished. The clean cloth is also to be renewed.

2) The spot-test operators, if returning to work after a long time, must be examined to see whether the differentiation of the different grades of steel are still familiar to them. The people must be entirely trustworthy, and if they are not perfectly familiar with the work, spot-testing must not be assigned to them.