Preparation method

Medium-hard to hard steel (35-65 HRC/850HV)

Recommended machines and additional consumables (not included)

**Cutting**
- Equipment: ATM Brilliant
- Consumables: Cut-off wheel: corundum, resin bond Anti-corrosion coolant

**Mounting**
- Equipment: ATM Opal
- Consumables: Hot mounting: Epo black, Epo-Max Cold mounting: KEM 15 plus

**Grinding/Polishing**
- Sample size: Ø 40 mm
- Notes: Planar grinding: Galaxy red, H₂O, 250-300 rpm, ►► Synchronous Rotation 30 min, until plane
- Pre-polishing: BETA, Dia-Complete Poly, 9 µm, 120-150 rpm, ►► Counter Rotation 30 min, 3:00-5:00
- Final polishing: IOTA, Dia-Complete Poly, 3 µm, 120-150 rpm, ►► Synchronous Rotation 30 min, 3:00-4:00
- Optional etching (chem.): Nital 3%, * Approx. 0:03

Notes:
- Use suitable cut-off wheels for ferrous material (e.g., ATM FS-C or D wheels)
- Cutting speed max. 0.25 mm/s
- Use mounting material for almost gap-free mounting
- Grind with GALAXY red
- Use the entire radius of the GALAXY disc
- Thoroughly wash samples and sample holder under running water after each grinding step
- For new materials start with longest recommended step times and optimize to shorter times
- Do not stack discs with different diamond sizes
- Clean samples, holders and hands under running water before each polishing step
- Use ethanol and blow dryer to avoid water stains
- Check after each step under the microscope if polishing marks are of equal size and randomly oriented
- Use the consumables only for hard steels and not for other materials

Pressure parameters and specimen size

<table>
<thead>
<tr>
<th>Specimen diameter [mm]</th>
<th>25</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Divergence in pressure used in the preparation methods</td>
<td>-(5 N...10 N)</td>
<td>-5 N</td>
<td>+5 N</td>
<td>-(5 N...10 N)</td>
<td></td>
</tr>
</tbody>
</table>

Notes:

BEGINNERS GUIDE

**Cutting**
- Use suitable cut-off wheels for ferrous material (e.g., ATM FS-C or D wheels)
- Cutting speed max. 0.25 mm/s

**Mounting**
- Use mounting material for almost gap-free mounting

**Grinding/Polishing**
- Grind with GALAXY red
- Use the entire radius of the GALAXY disc
- Thoroughly wash samples and sample holder under running water after each grinding step
- For new materials start with longest recommended step times and optimize to shorter times
- Do not stack discs with different diamond sizes
- Clean samples, holders and hands under running water before each polishing step
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SAMPLE MICROGRAPHS

**OK Sample polished**
- 20x micrograph of tempered steel after IOTA polishing
  - Minimal traces of scratches
  - Clean homogeneous surface
  - Pores and inclusions with clean edges

**NOK Sample polished**
- 20x micrograph of tempered steel after IOTA polishing
  - Pore in centre leaks corrosion product (rust)
  - Shorter rinsing with water, clean with ethanol
  - Fine dark haze
  - More cleaning, use soft clean paper or cloth to wipe sample clean
  - Large vertical scratches
  - Clean sample and sample holder, prolong or repeat IOTA step

**OK Etched Sample**
- 20x micrograph of tempered steel etched with Nital 3%
  - Uniform bainitic microstructure of medium hard steel
  - Optimized etching time and etchant concentration for your analysis requirements

Notes: