# STANDARD OPERATING PROCEDURE

**TASK:** Etching (Acid solutions)

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<tr>
<th>SOP No:</th>
<th>VA30</th>
<th>Version:</th>
<th>1</th>
<th>Date:</th>
<th>February 2008</th>
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<td>Dept/Div/School:</td>
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<td>Supervisor/Manager:</td>
<td>COURSE COORDINATOR</td>
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<td>Other Contacts:</td>
<td>LECTURING / TECHNICAL STAFF</td>
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## HAzaRDS:
- Acid burns, chemical fume inhalation (respiratory), skin, hand, finger and eye damage/burns.

## PROTECTIVE EQUIPMENT AND EMERGENCY EQUIPMENT:
- Approved Chemical mask, gloves and goggles. Apron. Fume extraction hood. First Aid Kit

## BEFORE YOU START
- Ensure you have read SOP and MSDS for all solutions in use. Ensure you have approval of use of equipment and have received an induction from staff.

## ALWAYS
- Wear approved safety gear and maintain a lean and safe working environment.

## JOB STEPS
- When mixing solution safety clothing must be worn. Always add acid to water.
- Clean metal surfaces thoroughly. Emery surface, pickle and wash thoroughly to remove oils - (Wear gloves to prevent contamination from fingers). Wipe carefully with methylated spirit holding piece by corners. All soldering must be complete before etching.
- Apply resist and allow to dry minimum of three hours – up to 15 hours depending on air temperature and thickness of resist.
- Scratch design through resist when dry. Design can also be applied to metal by painting resist onto surface in patterns.
- Submerge metal into acid which is at room temperature. Agitate acid and occasionally brush surface of metal with a feather.
- Etching will take anywhere from 5 minutes to several hours. Therefore test samples are imperative to achieving a good result. Check material regularly (wash thoroughly before handling), peel back small areas of bitumen resist to check the depth of bite.
- Once piece is etched evenly remove from acid, wash thoroughly and remove bitumen resist in mineral turpentine.

## ETCHING SOLUTIONS:
- **Gold:** Concentrated nitric acid HNO³ (167ml)  
  Concentrated hydrochloric acid HCl (500ml)  
  Water H²O - Distilled (333ml)
- **Silver:** Concentrated nitric acid HNO³ (500ml) / Concentrated hydrochloric acid HCl(500ml) or  
  Concentrated nitric acid HNO³ (250ml) / Water H²O - Distilled (750ml)
- **Copper, Brass and Aluminium:** Ferric Chloride FeCl³ (200grams)  
  Water H²O - Distilled (800ml)
- **Iron Zinc and Steel:** Concentrated nitric acid HNO³ (150ml)  
  Water H²O - Distilled (850ml)
- **Glass and Enamel:** Concentrated hydrofluoric acid HF (1000ml)

## WHEN YOU FINISH
- Ensure area is clean all surfaces must be wiped down thoroughly. Any acid spills must be reported immediately to staff.
**OHS Consultation and Approval**

(Ensure this section is completed and copied onto rear of SOP)

**OHS Consultation**

(Completion Instructions)

Print names and enter signatures and dates to certify that the persons named in this section have been consulted in relation to the development of this Standard Operating Procedure. Note that the OHS Representative (OHS Committee) certifies that consultation has taken place, and may not be involved in the original consultation.

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<th>Position</th>
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<td>Manager/Supervisor</td>
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<td>First employee using SOP</td>
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<td>Second employee using SOP (if applicable)</td>
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<td>OHS Representative (OHS Committee)</td>
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**SOP Approval**

*Name Authorising (Printed):* ..........................................................

*Signature:* .......................................................... *Date:* ..........................................................