

Metal finishing

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Toxic chemicals like cyanide, acids and alkalis can injure sewer workers. Heavy metals reaching our wastewater treatment plants can harm the treatment process and concentrate in the biosolids made by the treatment process. Certain natural processes in the receiving environment can leach out these metals, particularly when biosolids are used as an organic fertiliser/soil treatment. Each metal finisher must keep pollutant levels in trade waste discharges within acceptable limits.

For this guideline 'metal finishing' means the process of preparing and coating objects by electrochemical deposition and allied techniques. It applies to:

- electroplating/electropolishing
- anodising
- phosphate or chromate passivation
- heat treating
- powder coating/enamelling.

Key trade waste quality requirements

| Parameter | Generally accepted level |
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| Suspended solids | ≤500 mg/L |
| Total dissolved solids | ≤1500 mg/L |
| pH | Between 8.5-10 units |
| Cyanide | ≤5 mg/L (measured at r/rinse if no destruction) |
| Hexavalent chrome, copper, nickel, Zinc | ≤10 mg/L |
| Aluminium | ≤100 mg/L |
| Flow rate to sewer | Dependant on capacity of receiving sewer |

Note: Discharge limits may be varied under certain circumstances for individual dischargers.

Best practice management

- Strategies to minimise process chemical carryover and loss to sewer (e.g. effective racking/drainage).
- Effective pre-treatment to achieve compliance with discharge quality standards, including final filtration of fine particles from used water.
- Filtration, top-up and adjustment etc, to extend solution life, followed by correct handling of spent concentrates and chemicals.

- Staff training including methods and procedures for containment/control of accidentally spilled chemicals.

Design/installation

- The final effluent from metal finishing operations on each site must discharge through a pH-controlled shut off valve or pump. An air or electrically operated valve may be used. It must default to the **closed** position, if air/power supply is lost.
- The monitoring system prevents discharges to sewer outside the pH range consistent with acceptable waste water quality. When discharge is prevented, the water supply should shut off automatically, to prevent flooding to sewer or stormwater.
- To reduce carryover into running rinse tanks, a static rinse tank is incorporated between each process tank. Where heavy metal concentrations are high, a number of static rinse tanks may be required.
- Where more than one rinse tank follows a process, the counter-current rinsing technique is used.
- Running rinses from a number of different processes, which can be treated by a common system, may be combined prior to pre-treatment.
- Running rinses unaffected by a particular pre-treatment unit bypass the unit so that treatable used water streams are not diluted.
- Material in process tanks or static rinse tanks does not have direct access to sewer.
- All process and chemical storage areas comply with the [Bunding and Blind Tank Guideline](#).
- Liquid wastes and sludge that are not to be discharged to sewer are stored in an approved method prior to removal, for off-site treatment by a licensed liquid waste contractor. Refer to the [Bunding and Blind Tank Guideline](#).

Typical pre-treatment

- All used water from running rinses is directed to an automatic pH correction system for heavy metal hydroxide precipitation. pH control 'set limits' maximise insolubility of metals present in the waste stream (e.g. Cu, Cr³ [pH 7-8], Cd, Ni, Zn [pH 9-10]).
- Polymer dosing to aid coagulation/flocculation for the effective removal of precipitates from the waste stream.
- Running rinses containing pollutants needing individual pre-treatment, such as cyanide (CN) or hexavalent chromium (Cr⁶) are treated before combining with other streams.
- Unless specific approval has been given by the Trade Waste Branch, all wastes destined for disposal to sewer (other than running rinses) are treated in accordance with the [Batch Treatment Guideline](#).
- Where running rinse tanks are periodically drained, the discharge rate is controlled to maintain effective used water pre-treatment.

- Removal of all solids by screening, settling or filtration (e.g. belt or plate/frame press or filter sock).

Maintenance

- The build up of heavy metals in the static rinse tank(s) is controlled, so that an acceptable quality is maintained for running rinse tank overflow(s).
- The contents of static rinse tanks should be used to top up the preceding process tank.
- Running rinse flow rates are restricted to the minimum rate needed to effectively clean the work.
- To ensure correct operation, pH electrodes and automatic controls are serviced every 12 weeks. Calibration checks ensuring pH probes remain accurate to 0.5 of a pH unit are conducted weekly. Details of these operations are recorded in a logbook, which is made available to our Trade Waste Officers on request.

Glossary

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| Counter current rinsing | The technique of using the overflow from one running rinse tank as the inflow for another upstream rinse tank. |
| Heavy metal | Any metal which, in trace quantities, has a toxic effect on biological systems. |
| Heavy metal hydroxides | The insoluble salts formed when a solution containing dissolved heavy metals is made sufficiently alkaline. |
| Pollutant | Any substance which, when discharged above acceptable limits, could be detrimental to the sewerage system, its workers or the environment. |
| Pre-treatment | The physical and/or chemical process(es) used to remove pollutants in a waste stream, so that discharges are acceptable for disposal to sewer. |
| Process tank | Any vessel other than a running rinse tank, containing process chemicals, associated with the industrial activities undertaken on site. |
| Running rinse tank | Similar to a static rinse tank, but having a constant inflow of clean water and subsequent overflow of polluted water. The turnover of solution limits build up of carried over process chemicals so that work emerges in a clean enough condition to proceed down the line. |
| Sludge | From the metal finishing industry: the solid end products of the pre-treatment of used waters generated by metal finishing processes, or solids settled in the bottom of process and rinsing tanks. |

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| Static rinse tank (or drag out) | A tank of water, which is designed to rinse, carried over process chemicals off the work piece. The contents are treated when chemical concentration(s) reach a critical level or removed from site by licensed liquid waste contractor. |
| Waste stream | A flow of polluted waste water from one or more processes or process steps. |

More information

Mains Water Protection (AS/NZS 3500.1:2015)

[Backflow Prevention Requirements - Office of the Technical Regulator](#)

[Restricted Wastewater Acceptance Standards](#)