

Metal Finishing

Trade Waste Guideline No. 8

INTRODUCTION

Heavy Metals reaching SA Water's waste water treatment plants concentrate in the organic sludge. They are not rendered inert and can be leached out by certain natural processes in the receiving environment, particularly when it is used as an organic fertiliser/soil treatment. It is therefore the responsibility of each metal finisher to maintain pollutant levels in discharges within acceptable limits, so as to safeguard the sewage system, its workers and the environment.

DEFINITIONS

For the purpose of this Guideline "metal finishing" means the process of preparing and coating objects by electro deposition and allied techniques. It applies to the following:

- Electroplating / polishing / forming
- Phosphate / chromate passivation
- Powder coating / enamelling
- Anodising
- Heat treating

KEY TRADE WASTE QUALITY REQUIREMENTS

PARAMETER	GENERALLY ACCEPTED LEVEL
Suspended Solids	<500 mg/L average
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 ASPECTS

- Strategies to minimise process chemical carryover and loss to sewer (e.g. effective racking/drainage).
- Effective pre-treatment to achieve compliance with discharge quality regulations, including final filtration of fine particles from waste water.
- Filtration, replenishment 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 discharges 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.

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- 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 waste water streams are not diluted.
- Material in process tanks does not have direct access to sewer.
- All process and chemical storage areas comply with [Trade Wastes Bunding Guideline No 4](#).

TYPICAL PRETREATMENT

- All waste water from running rinses is directed to an automatic pH correction system for heavy metal precipitation. pH control 'set limits' maximise insolubility of contaminants present in waste stream (e.g. Cu, Cr³ (pH 7-8), Cd, Ni, Zn (pH 9-10)).
- Polymer dosing to facilitate coagulation/flocculation for the effective removal of contaminants from the waste stream.
- Running rinses containing contaminants 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 [Trade Waste Batch Treatment Guideline No. 17](#).
- Where running rinse tanks are periodically drained, the discharge rate is controlled to maintain effective waste water pre-treatment.
- Liquid wastes and sludges 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 [Trade Waste Blind Tank Guideline No. 3](#).
- 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 replace volume in the preceding process tank where suitable.
- Running rinse flow rates are restricted to the minimum rate required 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 Trade Waste Officers on request.

GLOSSARY OF TERMS

Backflow & Backflow Protection	Backflow is the undesirable reversal of flow within water supply pipes. Backflow protection is the physical and/or mechanical system(s) used to prevent pollution of the mains water supply. A Reduced Pressure Zone Device (R.P.Z.D.) is a mechanical device, which offers the highest level of backflow protection when fitted to the mains water supply.
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.

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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(s) 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 contaminants so that work emerges in a clean enough condition to proceed down the line.
Sludge	From Waste water Treatment Plant - the solid end products of the biological treatment of municipal waste waters. From Metal Finishing Industry - the solid end products of the pre-treatment of waste waters generated by metal finishing processes of solids settled in the bottom of process and rinsing tanks.
Static Rinse Tank (or Drag Out)	A tank of water, which is designed to rinse, carried over process solution off the work. The contents are treated when contaminant concentration(s) reach a critical level.
Waste Stream	A flow of polluted waste water from one or more processes or process steps.

ADDITIONAL INFORMATION

Mains Water Protection (AS/NZS3500-2003 Part 1), [Trade Waste General Policy](#), [Standards of Acceptance of Liquid Waste to Sewer](#).

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