Local Authority Pollution Prevention and Control

Permit to operate an installation for iron, steel and non-ferrous metal foundry process

Cronite Precision Castings Limited

Permit Reference Number PPC/022:

South Somerset District Council ("the Council") in accordance with Section 10(2) of the Pollution Prevention & Control (England and Wales) Regulations 2000 (as amended) ("the Regulations"), hereby permits:

Cronite Precision Castings Limited

whose registered office is:

Blacknell Lane
Crewkerne
Somerset
TA18 7YA

to operate an installation for iron, steel and non-ferrous metal foundry process as listed in Schedule 1, Chapter 2, Sections 2.1 and 2.2 of The Pollution Prevention and Control (England and Wales) Regulations 2000 at:

Blacknell Lane
Crewkerne
Somerset
TA18 7YA

Ordnance Survey Reference: 344812 109574

The permit is subject to the conditions specified in this document consisting of 13 pages.

Signed.......................................................
Alasdair Bell, Environmental Protection Manager
Authorised Officer

Dated the 19th September 2005
Scope

The permit applies to the installation, which comprises not just any relevant unit carrying out a Part B activity listed in Schedule 1 to the Regulations, but also directly associated activities which have a technical connection with that activity and which could have an effect on pollution. All conditions within the permit relate to the control of emissions to atmosphere.

Technical Guidance documents used in the preparation of this document:


Secretary of States Guidance Note PG2/4 (04) Secretary of State’s Guidance for Iron, Steel and Non-Ferrous Metal Foundry Process.

Date Annual Fee Required: 1st April
Date For Full Compliance: Immediate, unless otherwise stated.
Permit Prepared By: Paul Huntington (01458) 257447

Legislation

2. Pollution Prevention and Control (England and Wales) Regulations 2000 (as amended)

Residual Duty

There is implied in every permit a condition that, in operating the installation or mobile plant, the operator shall use the best available techniques (BAT) for preventing or, where that is not practicable, reducing emissions from the installation or mobile plant. BAT is defined in the regulations. This definition is reproduced in the supplementary notes supplied with this permit.

Definitions used in the conditions

Operator shall mean Cronite Precision Castings Limited.
Regulator shall mean South Somerset District Council.

Installation Description

The general location of the installation is marked in red on the attached Plan A (page 8). The installation boundary is marked in red on the attached Plan B (page 9).

The activity regulated by this permit is an iron, steel and non-ferrous metal foundry.

A full description of the process is given in Appendix 1 of this document.
Conditions

All conditions shall have immediate effect unless stated otherwise.

Visible and Odorous Emissions

1. All releases to air, other than condensed water vapour, shall be free from persistent visible emissions and free from droplets.

2. There shall be no offensive odour beyond the site boundary, as perceived by the regulator.

3. In the case of abnormal emissions, malfunction or breakdown leading to emissions the operator must:
   a. Investigate immediately and undertake corrective action.
   b. Adjust the process and undertake corrective action.
   c. Promptly record the event and actions taken.
   d. Notify the regulator without delay.

Particulate Emissions

4. Particulate emission concentrations from external emission points with a flow greater than 150 m³/minute shall not exceed 20 mg/m³.

5. The emission points subject to condition 4 are summarised in Table 1 below.

Table 1: Emission Points Requiring Particulate Monitoring

<table>
<thead>
<tr>
<th>Emission Point I.D.</th>
<th>Abatement Plant</th>
<th>Monitoring System</th>
<th>Process Area</th>
<th>Maximum Discharge Volume (m³/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Cartridge Filter</td>
<td>Unidata-Omicron Continuous monitor and alarm</td>
<td>Finishing (grinding)</td>
<td>200</td>
</tr>
<tr>
<td>E2</td>
<td>Cartridge Filter</td>
<td>Unidata-Omicron Continuous monitor and alarm</td>
<td>Finishing (auto-shotblast) Finishing (handgrit blaster) Finishing (fettling)</td>
<td>242</td>
</tr>
</tbody>
</table>

6. Compliance monitoring of particulate emissions shall take place within one year of the issue of this permit and annually thereafter.

7. Particulate matter stack emission concentration measurements shall be carried out in accordance with the main procedural requirements of BS ISO 12141:2002 or BS EN 13284 (or equivalent method with a measurement accuracy equal or better).

8. The operator shall inform the regulator of monitoring to be carried out at least 28 days before the survey is due to take place.

9. Prior to any emission measurement, a proposed sampling protocol shall be submitted to the Council. Sampling shall not commence until the Council approves in writing the proposed sampling protocol.
10 The results of emission testing shall be forwarded to the regulator within 8 weeks of the completion of the survey. These results should include process conditions at the time of monitoring.

11 The introduction of dilution air to achieve emission concentration limits is not permitted.

**Solvent Inventory**

12 A record of solvent consumption shall be maintained and made available for inspection by the Council. Solvent consumption is calculated using the following formula.

\[ C = I_1 - O_8 \]

Where

- \( C \) = consumption
- \( I_1 \) = solvent input
- \( O_8 \) = solvents recovered.

The total organic solvent input (\( I_1 \)) is calculated by the following formula.

\[ I_1 = IS + PS - FS \]

Where

- \( IS \) = the mass of organic solvent contained in bindings, diluents and cleaners in the initial stock at the start of the accounting period.
- \( PS \) = the mass of organic solvent contained in bindings, diluents and cleaners purchased during the accounting period.
- \( FS \) = the mass of organic solvent containing in bindings, diluents and cleaners in the final stock at the end of the accounting period.

**Dusty Stock And Waste Material Storage**

13 Stocks of dusty, or potentially dusty, materials and residues, including waste containing metal particulates, shall only be stored in the designated material and waste storage areas, and in such a way as to prevent wind whipping of particulate matter. Loading, transfer and handling of materials, shall be carried out in a manner which will minimise emissions of particulate matter to air.

14 All virgin or reclaimed dry sand used in connection with the process and stored outside shall be stored in purpose built silos, tanks, sealed bags or enclosed containers.

**Spillages**

15 Adequate provision shall be made for the containment of liquid or solid spillages. All spillages shall be cleared as soon as possible by the use of appropriate techniques. Dry sweeping of spillages shall not be permitted in circumstances where it may result in the generation of airborne particulate matter beyond the process boundary marked in red on the attached plan PPC/022/B (page 7).
Designated Operational Areas

16 All processes likely to emit any particulate matter (for example welding, burning-off of casting residues and casting) but excluding the storage and transfer of raw materials, shall be undertaken in an enclosed area or suitable building so as to minimise emissions to air.

Management and training

17 The operator shall implement an effective planned preventative maintenance programme for all aspects of the activity including all plant, buildings and the equipment concerned with the control of emissions to air. A record of such maintenance shall be made available for inspection to the regulator upon request.

18 Staff at all levels shall receive the necessary training and instruction in their duties relating to the control of the activity and emissions to air including:

- awareness of their responsibilities under the Permit; in particular how to deal with conditions likely to give rise to particulate emissions, such as the event of spillage.
- minimising emissions at startup and shutdown
- action to minimise emissions during normal conditions

19 The operator shall maintain a statement of training requirements for each operational post and keep a record of the training received by each person whose actions may have an impact on the environment. These documents shall be made available to the regulator upon request.

20 A record must be maintained of the following:

- abnormal emissions, malfunction or breakdown leading to emissions (condition 2)
- solvent consumption (condition 12)
- The inspection and maintenance of plant and equipment concerned with the control of emissions to air (condition 17).
- Training records (condition 19)

These records shall be maintained and kept by the operator for a minimum of two years and should be available for inspection to the regulator upon request.

21 At all times while this permit is in force, a copy of the permit shall be kept posted at the location of the installation in such characters and in such position so as to be conveniently read by persons having duties which are, or may be, affected by the matters set out in this permit.

22 A high standard of housekeeping shall be maintained at all times.
Appendix 1 - Description of Installation

The general location of the Authorised Process is marked in red on the attached plan PPC/022/A (page 6) and the specific location, with the installation boundary marked in blue, is shown on the attached plan PPC/022/B (page 7).

The activity is an precision casting ferrous and non-ferrous metal foundry process employing investment casting. It comprises wax melting and pattern making assembly, coating and shelling, dewaxing, mould firing, melting operations and post casting operations including knockout and finishing. These operation areas are marked on the attached plan PPC/022/C (page 8).

Wax Pattern and Shelling Operations (stage 1)

Wax injection machines are used to produce wax pattern replicas, which are manually coated with a ceramic shell material.

Particulate and wax fume emissions from this area are extracted and collected in a Smog Hogg electrostatic precipitation and filtration unit and the air is returned to the workplace at two vent points.

The wax pattern replicas are assembled onto runner bars, which enables several pieces to be cast simultaneously. The wax assemblies are then alternatively dipped in a ceramic slurry and manually coated with a layer of refractory (sand) material. Particulate emissions of sand generated by the refractory coating process are collected in an Airmaster Auto-M bag filter unit and the air is returned to the workplace.

Wax is removed from the ceramic shells using a high pressure Leeds and Bradford Boiler Making Company autoclave. The wax is drained and collected.

Particulate and volatile organic compound emissions from the autoclave are extracted to atmosphere at vent point, 7m above ground level (1m above roofline).

Mould Firing Furnaces - (stage 2)

Three gas fired furnaces are used to heat the ceramic moulds to 1000°C in order to fire off final traces of wax and to fully develop the ceramic bond.

Two mould fire off furnaces are rotary hearth Chatburn and Chantry Limited type, with single air/fuel recuperative burner systems and 2m beds, marked ‘1’ and ‘2’ on the attached plan PPC/022/C (page 8).

A further hearth furnace used in the process is a Midland Furnaces Limited furnace, also with a single air/fuel recuperative burner systems and a 1m bed, marked ‘3’ on the attached plan PPC/022/C (page 8).

All the emission points for these furnaces have a discharge volume of less than 150m³/min.

Melting Furnaces (stage 3)

Ferrous and non-ferrous metal is melted in four coreless induction furnaces. The metals include iron and steels (carbon steels, stainless steels and nickel and cobalt
alloys). The elements involved in melting are therefore Carbon, Chromium, Cobalt, Iron, Manganese, Nickel, Niobium and trace amounts (not intentionally added) of Sulphur and Phosphorous.

Clean metals (both virgin metals and scrap) are melted, alloyed, and held in three coreless induction furnaces detailed as follows:

One 175 kW Inductotherm furnace with 250kg, 130kg, 50kg and 30kg capacity refractory furnace crucibles, marked ‘4’ on the attached plan PPC/022/C (page 8).

One 225 kW Inductotherm furnace with a 300kg capacity refractory furnace crucible, marked ‘5’ on the attached plan PPC/022/C (page 8).

One 500 kW Inductotherm furnace with two 500kg capacity refractory furnace crucibles, marked ‘6’ on the attached plan PPC/022/C (page 8).

All molten metal is deslagged prior to casting in air into the ceramic moulds. Deslagging is carried out using a coagulant to form a crust on top of the molten metal, which is scraped off and disposed of to waste when cold.

There is no specific extraction for the removal of metal fumes during melt and pouring.

Exothermic powders are added after casting to avoid shrinkage porosity in castings. Cast moulds are cooled prior to knockout.

**Knockout and Finishing (stage 4)**

Ceramic cores are removed from the cores by chemical leaching in baths of diluted Sodium hydroxide. Alkaline vapours form the process are extracted to atmosphere.

Plant used in finishing comprises the following:

- 1 knockout hammer

  Particulate emissions of metal particles and grit are extracted and collected in an Airmaster 50M bag filter (discharge volume <50m³/min), the final emission is to atmosphere at vent point, 2.5m above ground level.

- 1 automatic stainless steel shot blaster

  Particulate emissions of metal particles and grit from are extracted and collected in an integral filter unit, the final emission is at an internal vent point

- 1 automatic mild steel shot blaster

- 2 hand grit shot-blasters

- 2 fettling benches

  Particulate emissions of metal particles and grit from the above shot blaster and fettling plant are extracted and collected in an Airmaster cartridge filter (discharge volume 242m³/min), the final emission to atmosphere is at vent point, 5m above ground level, marked ‘E2’ on the attached plan PPC/022/C (page 8). Vent point ‘E2’ is fitted with a Unidata-Omicron continuous...
indicative particulate monitor which activates a visual alarm in the event of an abnormal emission resulting from filtration failure.

- 1 hanger shot-blast

Particulate emissions of metal particles and grit are extracted and collected in a Shot Blast Engineering cartridge filter, the final emission is at internal vent point, 7m above ground level.

- 1 powercutter and 1 16” cut-off wheel

Particulate emissions of metal particles are extracted and collected in an Economech 330 cyclone and filter.

- 1 fettling booth

- 2 tig welding units

Particulate emissions of metal particles from the above fettling plant and welding fume from the above welding plant are extracted and collected in an Airmaster 60M bag filter (discharge volume 71m³/min), the final emission to atmosphere is at vent point, 4m above ground level.

- 2 double grinding machines and 2 power grinders

Particulate emissions of metal particles and foundry particles are extracted and collected in Air Master cartridge filter (discharge volume 200m³/min), the final emission to atmosphere is at vent point, 5m above ground level, marked ‘E1’ on the attached plan PPC/022/C (page 8). Vent point ‘E1’ is also fitted with a Unidata-Omicron continuous indicative particulate monitor which activates a visual alarm in the event of an abnormal emission resulting from filtration failure.

**Heat Treatment (stage 5)**

Castings can require heat treatment. Some heat treatment is carried out off-site or carried out on-site in four heat treatment furnaces, details as follows:

- 1 British Furnace Limited, sealed quench (gas fired) operating at up to 1000°C
- 1 electric furnace (manufacturer not specified), operating at up to 1000°C
- 2 electric air circulation furnaces (manufacturer not specified), operating at up to 750°C

Emissions of Carbon monoxide and Carbon dioxide from the heat treatment furnaces are extracted to atmosphere at vent points, 7m above ground level.

**Waste**

All waste materials are stored in an outside-designated waste area prior to removal off-site. Dusty materials are sheeted to prevent wind whipping.