

Reflex Flexible Packaging Ltd

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Reflex Flexible Packaging is hereby permitted by Telford & Wrekin Council to carry on printing process under Section 6.4(B)(a)(iv) and Section 7 of the Environmental Permitting (England & Wales) Regulations 2010 (as amended) and other activities as listed and described below within the installation boundary marked red on the attached plan reference Appendix 3 and in accordance with the following conditions.

Provenance Relevant

Dates

Description of the Installation

The following description divides the Installation into its activities and elements both those scheduled under the above regulations and those non scheduled elements required to be regulated because of their polluting potential and that have a direct association and a technical connection to the scheduled activities:

The installation comprises the following activities and elements:

- 1 Raw material storage element
- 2 Ink preparation element
- 3 The Printing activity
- 4 Waste Storage element
- 5 Conversion of printed substrate element

The printing process operated at Reflex Flexible Packaging Ltd is defined as the flexographic printing of polyethylene sheets using solvent borne inks. The site produces rolls of printed packaging inclusive of a barrier film that preserves the contents and prolongs their shelf life. No extrusion (blowing of plastic from resin pellets) takes place nor is there conversion (cutting of bags to shape).

1. Raw Material storage Element

Ink, solvent and adhesives are purchased and delivered to the site, being stored externally in a secure solvent store located in the yard of the main factory (see Appendix 4). This area is ventilated to atmosphere unabated, but is equipped with a bund to retain spilled liquids.

All deliveries are in the form of 205 litre, or 1000 litre sealed containers. Where applicable, these are transported into the mixing room or decanted into 20 litre drums for ease of transport. Raw materials in the form of inks are removed from the raw material storage area as and when required by press operators.

Press returns storage:

This area is stored internally within the raw materials area (see Appendix 4). Here, excess ink is returned from the presses and is stored as 'press returns' for future use either directly or by mixing with other ink. Press return inks are mostly stored in small sealed pails. The press returns store is a purpose built bunded area and any fugitive emission is vented to atmosphere.

The Raw storage element of the installation is technically connected and directly associated with the activities falling within Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2010.

2. Ink preparation Element

Ink is prepared within a dedicated ink mixing room located within the raw materials area. Specific formulations of ink are created according to the desired specification and are measured out by a competent person to ensure consistency. Most mixing takes place in containers of no more than 20 litres. All solvent and ink materials are dispensed in a totally enclosed system to the mixing vessel.

Given the enclosed system, there is only passive venting from the mixing room. This is via a grid on the external wall and is located at low level to collect any build up of fume.

The Ink preparation element of the installation is technically connected and directly associated with the activities falling within Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2010.

3. The Printing Activity

"CMF" flexographic printing press

The Nordmecchanica flexographic printing press (known as the "CMF") is prepared using the appropriate 'stereo' (a suitable design to be imprinted on the substrate). Ink and solvent are mixed to a specific ink formulation, typically containing about 35% solvent. The press ready ink is loaded into the machine at the ink tray. There are 8 separate ink trays each capable of holding a different colour. The press is then operated and the stereo is coated with the ink and the appropriate substrate fed into the machine. The stereo impresses the desired design onto the substrate. The printed substrate then passes to a dedicated hot air 'flash off' drier and the print cures. The printed substrate is then wound onto reels for distribution to the customer or for lamination. The press is then washed down with solvent before commencing the next batch. All solvents used for cleaning purposes are collected for reuse for cleaning or disposal off site.

"SOMA 1" flexographic printing press

This press operates in the same way as the CMF press above and is also an 8 colour printing press. The emission from the dryer is also ducted to the Regenerative Thermal Oxidisor system

before being released to atmosphere. All inks for both machines are stored in sealed containers and pumped directly to the ink trays within each press, solvents are stored within containers with self-closing lids; thereby reducing fugitive emission of solvent. Fugitive emissions of VOC's from the printing machines are minimised by the use of 'enclosed doctor blade chambers' and ink is recirculated through the chamber without exposure to the ambient air.

"SOMA 2" flexographic printing press

This press operates in the same way as the CMF and Soma 1 press above and is also an 8 colour printing press. The emission from the dryer is also ducted to the Regenerative Thermal Oxidiser system before being released to atmosphere. All inks for both machines are stored in sealed containers and pumped directly to the ink trays within each press, solvents are stored within containers with self-closing lids; thereby reducing fugitive emission of solvent. Fugitive emissions of VOC's from the printing machines are minimised by the use of 'enclosed doctor blade chambers' and ink is recirculated through the chamber without exposure to the ambient air.

Flexographic Printing is a scheduled Activity within under Section 6.4(B)(a)(iv) and Section 7 of the Environmental Permitting (England & Wales) Regulations 2010 (as amended)

Regenerative Thermal Oxidisation abatement of VOC

Emissions from the three printing presses are ducted directly to a Megtec RTO plant, which is designed to remove gas-phase organic solvents from process emissions to air and to degrade these by thermal oxidisation (heat).

The regenerative thermal oxidiser plant runs by being fed VOC from a central air duct that is piped from all three presses. The solvent laden air is transferred from the central duct to the RTO and once the RTO is up to temperature circa 860 degrees and is fed the VOC from the presses it ignites the solvent to keep the RTO at running temperature. If the machines are not running then it automatically switches to run on gas consumption until it is fed VOC again.

There are 3 beds on the RTO that switch periodically from one to other in a specific sequence to ensure the continual running the RTO.

In order to ensure correct operation, the RTO plant is continuously monitored for temperature and pressure drop across the system

This RTO plant is a VOC abatement system that is capable of complying with emission limit values (ELV) and is considered by statutory guidance to represent BAT in terms of VOC abatement. The technology is proven, robust, readily maintained and has low operating costs. The equipment has low maintenance needs and is readily adapted for minimised downtime.

As a critical piece of equipment in demonstrating compliance with the permit, the operation of the RTO plant is encompassed by an annual service contract and by a site planned maintenance contract

It is noted that there is both direct association and technical connection to the printing activities, in that all solvent material produced by the printing activities (with the exception of fugitive emissions) is then subsequently burnt off. The RTO plant is therefore regulated within this permit. Plant concerned with preventing emissions to atmosphere. The emissions from the printing press activities within the installation are ducted to RTO equipment installed for the purpose of removing pollutants prior to release to atmosphere. Table 3 (below) identifies the abatement plant that discharges to atmosphere via the identified emission stack. Equipment and emission stacks that emit direct to atmosphere are unabated emission points. Emissions that are vented internally to the installation are not listed and should be assumed to be fugitive emissions. RTO abatement of VOC's element of the installation is technically connected

and directly associated with the activities falling within Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2010.

4. Waste Storage Element

All solvent containing waste materials from the process are stored in appropriate sealed drums or containers and stored in the specified external waste/raw materials storage area, as marked on plan Appendix 4. This area has a bund capable of containing 110% of the volume of the largest container present.

Cylinder/Plate stripping

The Cylinder/Plate stripping element is the removal of printing plates from the printing cylinder. These are placed in the unit; where a water based cleaning substance is applied to remove excess ink. This activity has no direct extraction to atmosphere and any emission is vented to the internal workspace, as the cleaning takes place on the shop floor.

The waste material is then taken to the raw material storage area before being sent for final disposal.

Solvent recycling unit

Decommissioned no longer in use

5. Conversion of printed substrate Element

Lamination Element

The film is coated with a high solids / solvent free adhesive, which is applied by physical contact using rollers in the Nordmeccanica and Soma laminating machine. The coated film then meets the printed film and the two are pressed together and bonded to make the final printed hybrid product that is reformed into a reel. This reaction is non-solvent therefore without emission of VOCs. The substrate is also corona treated to aid ink adhesion, this releasing ozone to air.

Slitting Element

Plastic substrate is slit to form bags by two slitting machines. No solvent is used, nor any significant particulate matter produced.

The Conversion of printed substrate element of the installation is technically connected and directly associated with the activities falling within Schedule 1 of the Environmental Permitting (England and Wales) Regulations 2010.

**Table 1. Quantities of materials used
w Material Usage**

Raw Material	Usage (Tonnes)	Activity / Element	
Polythene Film	00	1,3	
Printing ink 35% solvent	105	1,2,3	

Activity/Element

Table 2. List of plant and equipment concerned with the installation

Equi

Plant/Equipment used	Activity / Element	Machine Ref numbers	Abatement	Emission Point
FMC press	3		RTO	A1
Soma 1 press	3		RTO	A1
Soma 2 press	3		RTO	A1

Plant used Activity/Element Machine reference numbers Abatement Emission Points

Plant concerned with preventing emissions to atmosphere

Table 3 (below) identifies the abatement plant or production equipment that discharges to atmosphere via the identified emission stack. Equipment and emission stacks that emit direct to atmosphere are unabated emission points. Emissions that are vented internally to the installation are not listed and should be assumed to be fugitive emissions.

Table 3 Abatement plant and Emissions

Plant or E

Plant/Equipment used	Abatement type	Machine Ref numbers	Emission Point	Pollutants
Regenerative Thermal Oxidisor	Burner		A1	VOC

S

*The emission stack from the RTO has a failsafe safety relief valve that triggers to protect the device, in such circumstances the emissions are direct to atmosphere. Similarly, in the event of fan failure for the extraction system, each press has a bypass to an alternate emission point.

Legend:

VOC – Volatile Organic Compound

Permit Conditions

1 Plant & Equipment

1.1 The Installation shall consist only of that plant and equipment listed in Table 2 (above). No other relevant plant or equipment capable of emitting pollutants to air shall be used without the prior written consent of the regulator.

1.2 Plant or equipment concerned with the prevention of emissions to atmosphere shall consist of that mentioned in Table 3 (above). No other abatement plant shall be used except where a formal written application has been submitted to, and approved by, the regulator.

2 Emission Limits and Controls – Air

2.1 There shall be no persistent visible emissions, other than steam or water vapour from the installation.

2.2 There shall be no offensive odour from the installation detected beyond the Installation Boundary, as perceived by the regulator.

2.3 Emissions from final point of discharge to atmosphere from the RTO plant serving the emission points listed in Table 3 shall not exceed the following concentrations of the substances and chemicals listed in Table 4 below:

Table 4

Emission	Concentration
Volatile Organic Compounds (as carbon)	100mg/m ³ as a 15 min mean

*expressed as Carbon excluding particulate matter

2.2 Emissions from the permitted installation, other than steam or condensed water vapour, shall be free from persistent mist and free from persistent fume.

2.4 The concentrations of the substances listed in condition 2.3 shall be expressed at reference conditions. 273K, 101.3kPa, without correction for water vapour content and the results of the monitoring shall be expressed in milligrams per cubic metre (mg/m³) and averaged over 15 minutes unless otherwise stated.

2.5 No piece of plant or equipment mentioned in condition 1.1 above (or any replacement used for the same purpose) shall be operated with an emission point direct to atmosphere unless specifically allowed within this permit or specifically agreed in writing with the regulator.

2.6 The introduction of dilution air to achieve compliance with emission limit values (ELV) shall not be permitted. In the event that an emission stack can be demonstrated to be compliant with condition 2.3 above, dilution air may be added to render harmless a visible or odorous emission.

2.7 Any bypass of the abatement plant shall be deemed an emergency and steps shall be taken to stop the process (or part thereof). The Council shall be immediately notified of any breakdown of the biological treatment plant or the LEV / ductwork system.

3.0 Monitoring, Sampling and Measurement of Emissions

3.1 The installation shall be observed for visible emissions weekly, or more often as may be prescribed in writing by the regulating authority, from a point providing an unimpeded view of the emissions points for the prescribed process. In the event of visible emissions being observed, immediate action shall be taken to (determine the cause of) and resolve the malfunction responsible for the emission, and, if necessary, action shall be taken to abate the emission. Contingency arrangements shall be instigated to prevent or reduce to a minimum any further visible emissions caused by the malfunction. The regulator shall be notified of any such occurrence as soon as practicable. The results of the observations shall be recorded in the logbook (required to be kept by condition 3.3), along with details of remedial action taken.

3.2 A weekly assessment shall be made for odour emissions from the installation while the process is operating at full capacity. The assessment shall be made at a point at or beyond the installation boundary where such an emission is most likely to be detected, taking into account the wind direction, source of odour, nearest neighbour, etc. The assessment must be made by a responsible person who has been instructed to carry out these duties. A record of all olfactory assessments shall be entered into the logbook required to be kept in accordance with condition number 3.3. The records shall include a subjective assessment of the nature and severity of any odour detected.

If offensive odour emissions are detected, immediate action shall be taken to determine the cause of the emission and to resolve the malfunction responsible for the emission. Contingency arrangements shall be instigated to prevent or reduce to a minimum any further odour emissions

caused by the malfunction. The regulator shall be notified of any such occurrence as soon as practicable.

3.3 A logbook shall be established and maintained which contains a record of all visual and olfactory observations made in accordance with conditions 3.1 and 3.2 and the results of the monitoring programme carried out in accordance with conditions 3.4 and 3.5. The records shall include the time and date of the observations, the location from which the observations were made, the wind direction, the weather conditions, the likely source of the emissions to air, details of any corrective action taken, and the name and position within the Company of the person undertaking the observations. The logbook shall be kept available for inspection by an authorised officer from the regulating authority at the premises occupied by the Company, and the records shall be retained for at least two years. The log may be paper based or electronic.

3.4 The results of all continuous monitoring shall be recorded (in a form to be agreed with the regulator within 3 months of issue of the permit), and retained for at least two years. These results shall be made available for inspection by an authorised officer of regulating authority on request. All results from periodic monitoring exercises shall be retained for at least two years from the date of the same. The log book shall also include any other information or documentation as may be required to be kept by other conditions within this permit.

3.5 The emissions from the stack serving the RTO as long as the RTO is above 800 degrees the operation of the plant is stable and complies with table 4. If it fall below 800 degrees the alarm will sound and preventative actions will be taken to rectify the operation.

Emission events that lead to the triggering of an alarm shall be recorded in the log book on the RTO system required to be kept in accordance with condition 3.3 along with details of the investigation into what caused the event. These events shall be reported to the Regulator as soon as reasonably practicable including actions taken to remedy any problems identified.

3.6 The FID CEM shall be calibrated on a weekly basis using a certified concentration span gas to ensure the accuracy of the readings. The unit shall be calibrated annually in accordance with the manufacturers' instructions, which shall be made available for inspection by the regulator.

3.7 The CEM shall provide reliable data for >95% of the operating time, (ie availability >95%). Any CEM device showing more than 5% downtime within any three month period shall be repaired or replaced as may be necessary. A manual or automatic procedure shall be in place to detect instrument malfunction and to monitor instrument availability

3.8 Emissions from the final point of discharge to atmosphere from the RTO plant shall be sampled for concentrations of the substances listed within table 4 on an annual basis. All Sampling shall be carried out in accordance with recognised standards as agreed with the regulator prior to monitoring taking place. The date of sampling shall be notified to the regulator at least 7 days prior to the sampling taking place. Results shall be expressed in accordance with the requirements of condition 2.3 and the results of monitoring to be supplied to the regulating authority within 28 days of completion of the monitoring. Further, monitoring reports shall be submitted in both paper copy as a summary and in full in an electronic format.

3.9 The operator shall construct an inventory of solvent use within the installation. The inventory shall be carried out by recording:

(i) The mass of solvent contained in inks, coatings, diluents and cleaners in the initial stock (I_s) at the start of the accounting period, plus

(ii) The mass of solvent contained in inks, coatings, diluents and cleaners in the purchased stock (P_s) during the accounting period

(iii) Minus the mass of solvent contained in inks, coatings, diluents and cleaners in the final stock (F_s) at the end of the accounting period

$$\text{Then Total Solvent Input } (I_1) = I_s + P_s - F_s$$

The inventory shall specifically and separately identify any VOCs carrying any of the R-Phrases as prescribed within the Solvent Emissions (England & Wales) Regulations 2004.

Further, having calculated total solvent Input (I_1), the operator shall then calculate solvent consumption by subtracting from the Input figures any solvent that is sent out for recovery.

Hence: C (consumption) = $I_1 - O_s$

4.0 Materials handling

4.1 The raw materials used in the installation and all waste materials produced from the activities therein shall be handled with care to prevent or reduce to an absolute minimum any emissions to air.

4.2 Spillages of liquids and finely divided materials shall be cleaned up immediately.

Liquid spillages shall be contained and cleaned up by the use of a suitable absorbent material. Spillages of finely divided or powdery materials shall be with an industrial grade vacuum cleaner or by wet cleaning methods, dry sweeping shall not be permitted. Vehicular movement of powdery materials using uncovered containers shall be prohibited unless the material is thoroughly damped to prevent wind entrainment.

4.3 All raw materials and waste materials shall be delivered only into the storage and waste storage areas marked and designated on the plan in Appendix 4 and nowhere else within the installation. Raw material or waste noted to be outside the designated areas shall be considered a spillage and shall be dealt with in accordance with condition 4.3.

4.4 Drums and containers containing liquid materials, whether full, partly full or empty, shall be stored in a secure, well-ventilated storage area as noted in condition 4.3 (above). All full, partly full or empty drums and containers shall be kept tightly closed to prevent any emissions to air.

4.5 Mixing of inks with solvents must be carried out in the mixing room / raw material storage area and undertaken in a manner that minimises spillages.

4.6 In order to demonstrate BAT and minimise fugitive emissions, the emissions from the emptying of mixing vessels and from the transfer to printing machines shall be adequately contained to minimise emissions of fugitive VOCs, by the use of closed transfer systems. This may be achieved by the use of enclosed mobile containers, containers with close-fitting lids, or, enclosed containers with pipeline delivery.

4.7 Application of cleaning solvents shall be:

- From a contained device or automatic system when applied directly on to machine rollers.
- Dispensed by piston type dispenser or similar contained device, when used on wipes.
- Via the use of Pre-impregnated wipes which shall be held within an enclosed container prior to use.

- From minimum amounts of solvent poured carefully onto designated cleaning cloths.

Solvent Wipes and other items contaminated with solvent shall be placed in a suitably labelled metal bin fitted with a self-closing lid. Bins shall be emptied at least daily. Special bins that allow air to circulate beneath and around them to aid cooling shall be used for materials that may undergo spontaneous combustion.

4.8 Where cleaning solvents are decanted into other containers they shall be contained in self-closing containers.

A review programme shall be undertaken to determine whether organic solvent free cleaning fluids or significantly less volatile organic solvent cleaning fluids can be used (with or without the addition of mechanical, chemical or thermal enhancements) in preference to the traditional solvent based cleaners in use at the date of issue of this permit. The evaluation shall be completed within 3 months of issue of the permit and shall provide details of potential substitute cleaning materials. Where materials are identified that can replace existing cleaning solvents, these shall be placed in use within 3 months of completing the review programme.

The review programme itself shall be repeated every two years from the date of issue of this permit. A copy of the review programme shall be kept with the log book required to be kept by condition 3.3.

4.9 Where fixed equipment is cleaned in-situ, it shall be kept enclosed whilst cleaning is carried out. At all times during the cleaning operations the LEV and the RTO plant shall be fully operational.

4.10 Residual ink contained in parts of the press shall be removed prior to cleaning.

5.0 Dispersion of contained emissions

5.1 The final efflux velocity of all emissions to air from any contained source must not be less than 10 m/sec.

5.2 The stack serving the RTO plant shall not be fitted with any restrictive plates, caps or cowls at the final opening.

5.3 Within 6 months of the date of this permit, the stack serving the RTO shall conform to be a height as determined in accordance with the document entitled, "The Determination of Discharge Stack Heights for Polluting Emissions", published by HMIP. This calculation shall be submitted to the regulator for approval within 2 months of the issue date of this permit. This can be removed if you have the details of the calculations when the plant was first put in. The condition will then state the height of the stack.

5.4 Any emission stack bypassing the RTO (or any replacement or additional arrestment plant used for the same purpose), shall be maintained at a height as calculated in condition 5.3, or at a height of at least 1m above the roofridge.

6.0 General Conditions

6.1 Regular cleaning and effective preventative maintenance in accordance with the manufacturer's instructions shall be employed on all plant and equipment concerned with the emission, capture, transport and control of emissions to atmosphere. Such cleaning and maintenance procedures shall be updated from time to time as may be necessary to account for changes in working practice or plant and machinery or solvents used.

Spares and consumables, in particular, those subject to continual wear, shall be held on site, or shall be available at short notice so that plant breakdowns can be rectified rapidly.

6.2 Staff at all levels shall receive the necessary formal training and instruction in their duties relating to control of the process and emissions to air. Records shall be kept which detail all relevant training provided to staff, the records shall be made available for inspection by an authorised officer from the regulating authority. Records of training shall be retained for two years.

6.3 If there is any intention to change any aspect of the installation from that described within the process description, or any other aspect which may affect the substances or concentration of substances set out in condition 2.3 being emitted to air, the regulating authority shall be notified of the proposed changes at least 4 weeks before the changes take place.

6.4 Any malfunction which results in emissions to atmosphere which are likely to cause an adverse effect on the local community shall be reported to the regulator, and a record shall be made of the incident within the logbook required by condition 3.3.

6.5 The best available techniques shall be used to prevent or, where that is not practicable, reduce emissions from the installation in relation to any aspect of the operation of the installation which is not regulated by any other condition of this permit.

7.0 Air Quality

7.1 If so required by the Borough of Telford and Wrekin, the operator shall prepare a list of all emission points, and related pollutant emissions to atmosphere based on Table 2 (above). The operator shall provide details (where known) of the emissions of those pollutants to atmosphere as a result of any sampling that may be carried out (see condition 3.4 above). Where sampling is not carried out, the operator shall prepare an estimate of the emissions to atmosphere based on data collected in accordance with conditions 3.5 and 8.2. Where sampling is carried out, no correction for atmospheric pressure or water vapour need be made.

If so required by Borough of Telford and Wrekin, the operator shall also submit for each point of emission to atmosphere details of stack height, volume flow rate and stack diameter, as well as the height, width and length of the building to which the stack (or stacks) are attached.

If so required by Borough of Telford and Wrekin, the results shall be tabulated and submitted in Microsoft Excel format and shall be sent to the following email address (or another to be specified by the regulator):

Tony.Higgins@telford.gov.uk

Such information shall be submitted as and when requested by the regulator.

8.0 Solvent Emission Directive

8.1 The total emissions of VOCs from the equipment listed in Table 2, which are not vented through the abatement, shall not exceed 20% of the solvent inputs, as determined from the Solvent Management Plan.

8.2 Based on the data compiled for condition (3.5), and the descriptions in Appendix 1, the operator shall calculate the percentage of fugitive emissions applicable to the installation. To demonstrate compliance with fugitive emission values in required in condition (8.1) above, the operator shall determine the fugitive emissions (F) from the activity using the following:

$F = I1-O1-O5-O6-O7-O8$

Or

$$F=O_2+O_3+O_4+O_9$$

Definitions of the outputs ("Os" are shown in Appendix 1. Each can be determined by direct measurement of the quantities or, an equivalent calculation can be made by other means, for instance by using the capture efficiency of the process.

The Fugitive Emission value as a percentage of the Solvent Input (I) is determined by

$$\text{Fugitive Emission Value} = 100 \times F/I$$

Where the Solvent Input (I)= I₁+ I₂

Fugitive emission values must be determined for the activity, and must be repeated when any equipment or process modification is carried out. (see Appendix 1).

8.3 At no time shall the operator introduce any substance or preparation into the installation that is labelled with the risk phrase of R45, R46, R49, R60 or R61, without the prior written consent of the regulator. Substances or preparations already in use shall be replaced with non-designated substances in accordance with a scheme to be submitted to the regulator within 3 months of issue of this permit.

8.4 The operator has currently selected the emission limit route for demonstrating compliance with the requirements of the solvent emissions directive. Should the operator wish to change the compliance route to the alternative reduction scheme route, an application in writing must be submitted to the regulator six months before any change is made, along with an appropriate calculation demonstrating compliance with the required Target Emission.

Appendix 1: Solvent Management Diagram

Not Changed from last drawing

Appendix 2: Location plan

Attached

Appendix 3: Location plan showing boundary in red

Not Changed from last drawing

Appendix 4 – Site Layout Plan,

Attached