Polex Environmental Engineering Pty Ltd
ACN 121 129 842

PRELIMINARY / DRAFT REPORT

Company	Pact Group
Attention	Gopi Dhanekula
From	Grant Stevens
Date	10 May 2022
Subject	Extraction systems – rev B

Dear Gopi,

Thank you for the opportunity to prepare this report.

The purpose of the report is for the preliminary design of extraction systems to extract, filter and exhaust fugitive emissions generated during filling and storage of liquid productps at the new JALCO plant located in Horsley Park, NSW.

The JALCO production plant consists of multiple bulk storage tanks, mixing tanks and liquid filling lines for the preparation and packaging of liquid products.

There is a large number (150+) chemicals that are used in the storage and filing processes. These chemicals are added to water in low concentrations. A typical 80 tonne batch consists of 80% water and 20% of the various chemicals.

During the filling of the BULK STORAGE and MIXING TANKS, vapour laden air is displaced from the tanks. Our design method is based on localised extraction to ensure that fugitive emissions are captured at source, which is through direct connection to the top of each tank. Replacement air is introduced through an overflow pipe connected to the top of each tank. The fugitive emissions from the LIQUID FILLING MACHINES are managed by creating sufficient air velocity (1 m/s) through the openings into and out of the enclosures associated with the liquid filling lines to ensure that emissions do not escape into the areas occupied by production staff. With proper coverage on the top of the filling machines, a maximum of 10% fugitive emissions into the surrounding workspace is achievable. After the fugitive emissions are captured at source, they are transported through ducting, filters, fans and exhaust stacks.

There are two independent systems being proposed.

One system is for the extraction and filtration of emissions from the Liquid filling lines (LF) and the Enzyme room. Filtration is through 2 stages: HEPA filtration for the enzymes, and CARBON filtration for the odours. The filter system also incorporates pre-filters for the removal of any airbourne particulates, which protects both the HEPA and CARBON filters.

The second system is for the extraction and filtration of emissions from bulk tanks (BT-01 to BT-15), mixing tanks (MT-01 to MT-13), hopper for citric acid area, hopper for salt mixing and the dispensary area. Filtration (adsorption) is through activated CARBON. The filter system also incorporates pre-filters for the removal of any airbourne particulates, which protects the CARBON filters.

Given the large range and various proportions of chemicals used, determination of the reduction of odour units from the production processes is best suited to selecting a maximum vapour / odour contact time with the activated CARBON filters. Activated CARBON filtration efficiency is based on the

contact time that the vapour is in contact with activated CARBON to allow proper adsorption. We are basing our design on typical chemical vapour contact times used in industry to provide effective adsorption to achieve 90%-95% adsorption of the range of diluted chemical vapours.

In the event that additional HEPA and/or CARBON filtration is required due to increased fugitive emissions (ie. Due to unexpectedly high vapour concentration), we are proposing to use a MODULAR filtration system. The HEPA and CARBON filter modules are housed in sections that simply bolt together to allow the entire filter assembly to be extended. The area within the factory has been selected to facilitate the extension of the filter system. Please note that the fan size and ducting size will not be affected by the addition of CARBON modules because they will be added in a parallel configuration. For this scenario, the fan airflow and pressure do not need to be increased. We have also allowed for a safety margin in our airflow calculations to cater for slight increases in airflow required.

Below is a summary of the critical conceptual information for airflows, inlet duct, filters, fans and exhaust stacks.

We have attached the following files for reference to our calculations and sketches:

ESR Horsley PK Site V20- Ventilation_1 - POLEX MARKUP 2022-05-05
PACT GROUP AIRFLOWS – CARBON - 2022-05-05
PACT GROUP AIRFLOWS – HEPA CARBON - 2022-05-05
PACT GROUP DUCT PRESSURE LOSS – CARBON - 2022-05-05
PACT GROUP DUCT PRESSURE LOSS – HEPA CARBON - 2022-05-05
J1401-01-A-FI01 - HEPA + CARBON FILTER
J1401-01-A-FI02 - CARBON FILTER

SYSTEM 1: HEPA / CARBON FILTER SYSTEM

EQUIPMENT

Includes airflow from Liquid filling lines (LF) and the Enzyme room.

Liquid filling lines (LF): We have assumed 200 mm dia duct connections with 15 m/s velocity. There is not enough information at this stage for a full airflow gap analysis through the filling machines.

Enzyme room: The largest amount of airflow required is through the roller door.

AIRFLOW

Total airflow calculated: 29,745 m^3/h
(Based on ambient gas temperature)

INLET DUCT

Duct velocity: approximately 15 m/s
Largest inlet duct diameter: 850 mm

EXHAUST STACK

Exhaust stack duct diameter: 850 mm with 700 mm dia final exit to achieve 21.5 m/s discharge velocity

FILTER BOX (HEPA / CARBON)

Filter box dimensions: 4.2 m long x 1.4 m wide x 3.5 m high (excluding fan)

12 x PRE filters 595x595x95 mm
12 x HEPA filters 595x595x300 mm
12 x CARBON filters 595x595x400 mm

EXHAUST FAN

29,745 m^3/h @ 6,529 Pa (total static)
Belt-drive, single inlet centrifugal 110 kW

SYSTEM 2: CARBON FILTER SYSTEM

EQUIPMENT

Includes airflow from:

Bulk tanks (BT-01 to BT-15)
Mixing tanks (MT-01 to MT-13)
Hopper for citric acid area
Hopper for salt mixing
Dispensary area

AIRFLOW

Total airflow calculated 11,394 m^3/h
(Based on ambient gas temperature)

INLET DUCT

Duct velocity: approximately 15 m/s
Largest inlet duct diameter: 600 mm

EXHAUST STACK

Exhaust stack duct diameter: 600 mm with 450 mm dia final exit to achieve 20 m/s discharge velocity

FILTER BOX (CARBON)

Contact time: 1 second
Carbon bed depth: 400 mm

Filter box dimensions: 7.7 m long x 1.4 m wide x 2.4 m high (excluding fan)
22 x PRE filters 595x595x95 mm
22 x CARBON filters 595x595x400 mm

EXHAUST FAN

11,394 m^3/h @ 6,217 Pa (total static)
Belt-drive, single inlet centrifugal 45 kW

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If you need any further information at this stage please contact me.

Yours sincerely,

Grant Stevens

B.E. (Mech)
Managing Director
Polex Environmental Engineering Pty Ltd