SUSTAINABLE
PROJECT MANAGEMENT

Warrnambool Asphalt Batch Plant
Fulton Hogan

Addendum to Development Licence Application

EPA Application # APP010981

Issue Date: 28/06/2022
Status: Approved
Revision: 1
Information Security Classification: **OFFICIAL**

Document Status

Revision History

Revision	Date	Owner	Approver	Reason for issue	Review date
A.1	28/06/2022	JC		FH Review	30/06/2022
1	30/06/2022	JC	FH	Issue to EPA	

This document is uncontrolled once printed

Table of Contents

1. Introduction

This addendum to Fulton Hogan's Development Licence Application (APP010981) for a proposed asphalt batch plant at 86 Rodgers Road Warrnambool provides responses to requests for information from the EPA.

2. Request for Information RFI002259

The EPA issued RFI1002259 on 15 June 2022. The following sections provide responses to this RFI.

2.1. Throughput of 50,000 to 100,000 tpa

EPA request:

The application document (126_01_Fulton Hogan EPA DLA - ABP-Wbool_Rev1_3 Feb 22.pdf) indicates that the proposed throughput is up to 50,000 to 100, 000 tonnes per year. Provide an explanation as to why the range of annual throughput is proposed

SPM / Fulton Hogan Response:

Fulton Hogan expect the proposal, in the initial years of operation, will operate at a typical throughput of approximately 50,000 tonnes per annum. However, it is envisaged that potential infrastructure development and possible planning decisions in the region, may increase requirements for asphalt such that the plant will produce up to 100,000 tonnes per annum to meet this demand.

2.2. GHG Emissions for 100,000 tpa

EPA request:

GHG emissions were calculated based on 50,000 tonnes per year not 100,000 tonnes per year. Provide a justification for using the minimum value. Provide GHG emissions at the maximum throughput (100,000 tonnes per year).

SPM / Fulton Hogan Response:

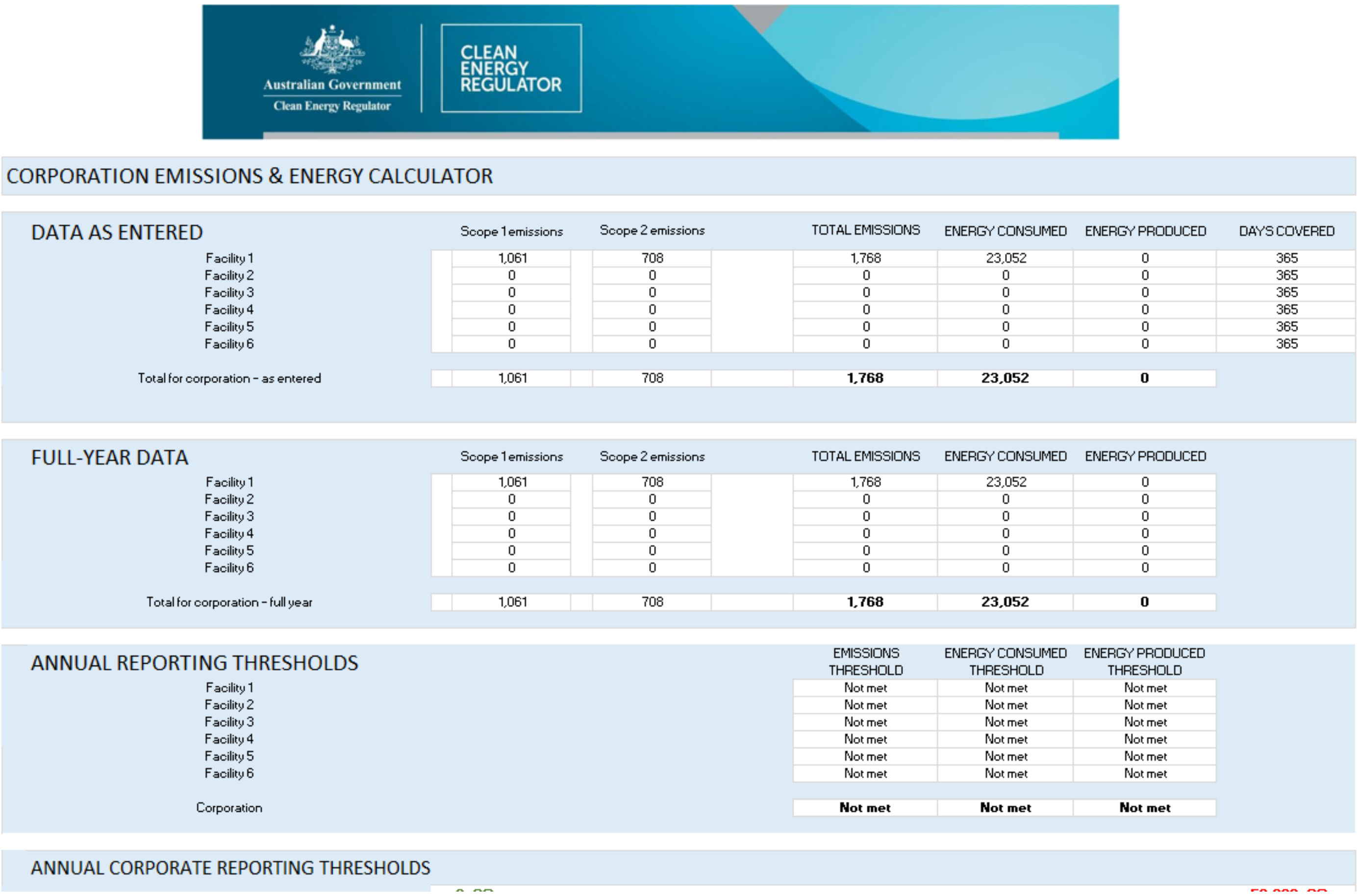
Based on energy usage data from other Fulton Hogan asphalt batch plants, it is estimated that overall energy usage (of gas and electricity) for the proposal will be 0.277 GJ/tonne; this is based on 0.026 GJ/tonne electricity usage (electricity usage at the existing Warrnambool site) and 0.201 GJ/tonne gas usage (burner rates of the dryer drum). Therefore, for a maximum annual production of 100,000 tonnes per annum, maximum gas and electricity use for the batch plant is approximately 22,700 GJ; made up of:

- 2,600 GJ of electricity and
- 20,100 GJ of natural gas.

In terms of diesel usage for mobile plant, the existing Warrnambool site used 9,120 L diesel for mobile plant (i.e., loader, backhoe and forklift) in FY20-21 and similar amount is expected to be used at the new plant.

Estimated total emissions for the proposed Warrnambool plant, calculated using the Energy Threshold Calculator (refer to outputs below) are 1,768 t CO_2-e with the breakdown as follows:

- 1,061 t CO_2-e for non-transport related natural gas related emissions (Scope 2); and
- 708 t CO_2-e for electricity related emissions (Scope 1).



Australian Government
Clean Energy Regulator

CLEAN ENERGY REGULATOR

CORPORATION EMISSIONS & ENERGY CALCULATOR

DATA AS ENTERED

	Scope 1 emissions	Scope 2 emissions	TOTAL EMISSIONS	ENERGY CONSUMED	ENERGY PRODUCED	DAYS COVERED
Facility 1	1,061	708	1,768	23,052	0	365
Facility 2	0	0	0	0	0	365
Facility 3	0	0	0	0	0	365
Facility 4	0	0	0	0	0	365
Facility 5	0	0	0	0	0	365
Facility 6	0	0	0	0	0	365
Total for corporation - as entered	1,061	708	**1,768**	**23,052**	**0**	

FULL-YEAR DATA

	Scope 1 emissions	Scope 2 emissions	TOTAL EMISSIONS	ENERGY CONSUMED	ENERGY PRODUCED
Facility 1	1,061	708	1,768	23,052	0
Facility 2	0	0	0	0	0
Facility 3	0	0	0	0	0
Facility 4	0	0	0	0	0
Facility 5	0	0	0	0	0
Facility 6	0	0	0	0	0
Total for corporation - full year	1,061	708	**1,768**	**23,052**	**0**

ANNUAL REPORTING THRESHOLDS

	EMISSIONS THRESHOLD	ENERGY CONSUMED THRESHOLD	ENERGY PRODUCED THRESHOLD
Facility 1	Not met	Not met	Not met
Facility 2	Not met	Not met	Not met
Facility 3	Not met	Not met	Not met
Facility 4	Not met	Not met	Not met
Facility 5	Not met	Not met	Not met
Facility 6	Not met	Not met	Not met
Corporation	**Not met**	**Not met**	**Not met**

ANNUAL CORPORATE REPORTING THRESHOLDS

2.3. GHG Calculation inputs

EPA request:

3. The application document provides GHG emissions for Scope 1 and Scope 2 (in Table 7-2) and indicates that purchasing of 100 % renewable electricity by Fulton Hogan is taking place, and it does not show what activities are included in the GHG emissions for Scope 1 and Scope 2. Provide calculation details for each scope indicating applicable activities.

SPM / Fulton Hogan Response:

Scope 1 emissions comprise:

- Rated gas usage for gas burner (dryer drum);
- Diesel usage for mobile plant (loader, backhoe and forklift) (based on usage at existing Warrnambool plant which is expected to be similar to proposed facility)

Scope 2 emissions comprise:

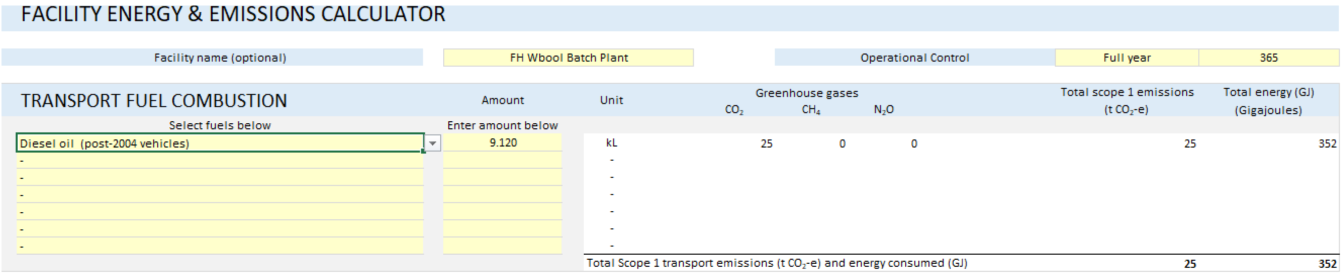
- Electricity usage - estimated usage for operation of batch plant etc and based on the existing Warrnambool plant.

As per Section 7.4.5 of the DLEA:

> *The above assessment does not consider that the electricity will be purchased through the Melbourne Renewable Energy Project and will therefore be carbon neutral as discussed in Section 7.5.4. Further, the above assessment does not consider the net CO2-e benefit generated by the production of RAP products.*

The above assessment also ignores the fact that the existing Warrnambool plant will be decommissioned and replaced with more energy efficient plant (e.g., burner for drier drum). As such the overall energy use (and GHG emissions) at the proposed facility, per tonne of asphalt produced, is likely to reduce.

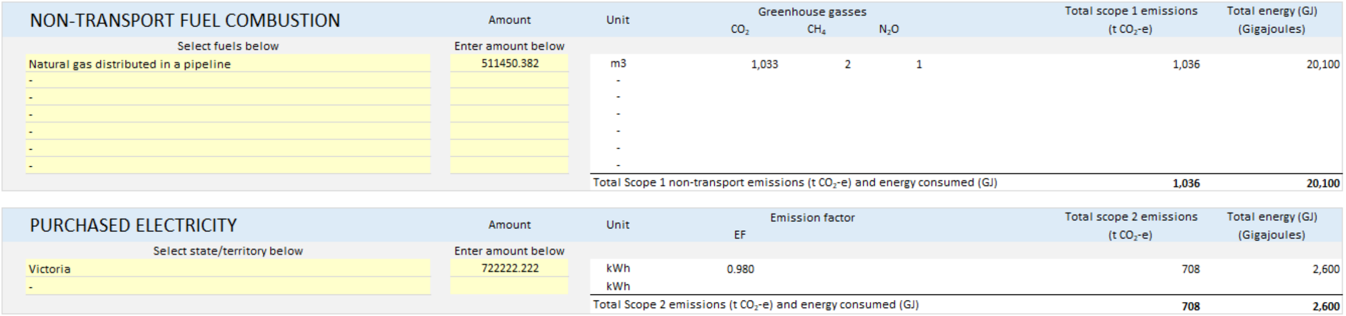
The GHG calculator outputs above (for 100,000 tpa) are based on the inputs (and unit conversions) below (screen shots from the GHG calculator).



FACILITY ENERGY & EMISSIONS CALCULATOR

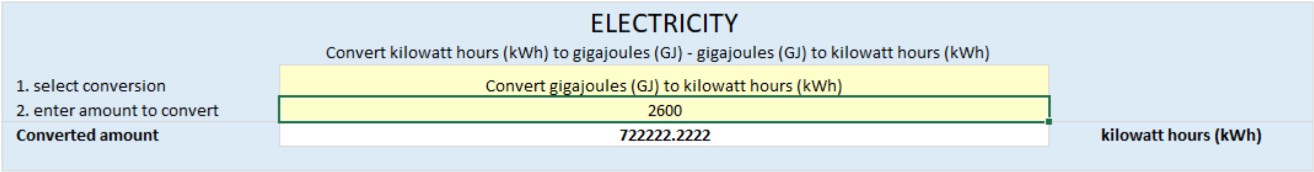
Facility name (optional)	FH Wbool Batch Plant	Operational Control	Full year	365

TRANSPORT FUEL COMBUSTION	Amount	Unit	Greenhouse gases CO_2	 CH_4	 N_2O	Total scope 1 emissions (t CO_2-e)	Total energy (GJ) (Gigajoules)
Select fuels below	Enter amount below						
Diesel oil (post-2004 vehicles)	9.120	kL	25	0	0	25	352
-		-					
-		-					
-		-					
-		-					
-		-					
-		-					
		Total Scope 1 transport emissions (t CO_2-e) and energy consumed (GJ)				**25**	**352**



NON-TRANSPORT FUEL COMBUSTION	Amount	Unit	Greenhouse gasses CO_2	 CH_4	 N_2O	Total scope 1 emissions (t CO_2-e)	Total energy (GJ) (Gigajoules)
Select fuels below	Enter amount below						
Natural gas distributed in a pipeline	511450.382	m3	1,033	2	1	1,036	20,100
-		-					
-		-					
-		-					
-		-					
-		-					
-		-					
		Total Scope 1 non-transport emissions (t CO_2-e) and energy consumed (GJ)				**1,036**	**20,100**

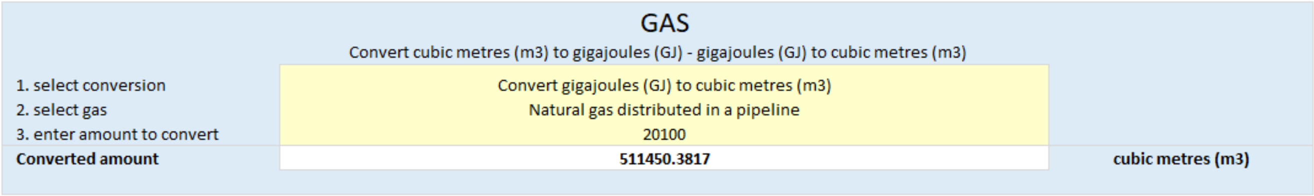
PURCHASED ELECTRICITY	Amount	Unit	Emission factor EF	Total scope 2 emissions (t CO_2-e)	Total energy (GJ) (Gigajoules)
Select state/territory below	Enter amount below				
Victoria	722222.222	kWh	0.980	708	2,600
-		kWh			
		Total Scope 2 emissions (t CO_2-e) and energy consumed (GJ)		**708**	**2,600**



ELECTRICITY

Convert kilowatt hours (kWh) to gigajoules (GJ) - gigajoules (GJ) to kilowatt hours (kWh)

1. select conversion	Convert gigajoules (GJ) to kilowatt hours (kWh)	
2. enter amount to convert	2600	
Converted amount	**722222.2222**	**kilowatt hours (kWh)**



GAS

Convert cubic metres (m3) to gigajoules (GJ) - gigajoules (GJ) to cubic metres (m3)

1. select conversion	Convert gigajoules (GJ) to cubic metres (m3)	
2. select gas	Natural gas distributed in a pipeline	
3. enter amount to convert	20100	
Converted amount	**511450.3817**	**cubic metres (m3)**

2.4. EPA Principles of Environment Protection

EPA request:

4. EPA has eleven principles of environment protection ('principles') on which the EPA must operate. Refer to Part 2.3 of the Environment Protection Act 2017. The applicant must demonstrate that their application incorporates technologies, techniques and other measures that are capable of meeting each of these principles. Demonstrate compliance with the principles of the Environment Protection Act 2017 in the application.

SPM / Fulton Hogan Response:

The principles of environmental protection are assessed in the table below.

Principle No.	Principle Title	Principle Description	Summary Statement addressing Principle
13	Principle of integration of environmental, social and economic considerations	Environmental, social and economic considerations should be effectively integrated	The proposal balances the need to develop risk proportionate asphalt producing infrastructure and process management and monitoring with the social context of the site and local and regional community and the ongoing and increased rate of development in the states south-west region which will benefit from locally manufactured road-making materials.
14	Principle of proportionality	A decision, action or thing directed towards minimising harm or a risk of harm to human health or the environment should be proportionate to the harm or risk of harm that is being addressed.	The chosen location, and the physical infrastructure and processing have been selected and designed by Fulton Hogan to provide a risk proportionate proposal. Risks have been identified and analysed to ensure the proposal always minimises the risk of harm to human health and the environment. Refer Section 14 of the DLA for the detailed Risk Assessment.
15	Principle of primacy of prevention	Prevention of harm to human health and the environment is preferred to remedial or mitigation measures.	Site selection and design of the proposal have been aimed at preventing risk as far as is reasonably practicable and have been prioritised to adopt the principle of primacy of prevention. The selection of a site in an industrial zone and 650 m from the nearest sensitive receiver, avoids or minimises impacts to human health (e.g. noise and odour impacts). Prevention or minimisation of environmental impacts have been prioritised through selection of technology / design features including selection of a more efficient burner (reduced GHG emissions) and filtration system which allows for collection, control and reuse of dust emissions generated through batching/handling process, incorporation of recycled RAP and glass materials, fully sealed site (providing negligible risk of soil / groundwater impact) and capture of potentially contaminated water for

Principle No.	Principle Title	Principle Description	Summary Statement addressing Principle
			on-site treatment (providing negligible risk of surface water impacts).
16	Principle of shared responsibility	Protection of human health and the environment is a responsibility shared by all levels of Government and industry, business, communities and the people of Victoria	Fulton Hogan recognises and accepts responsibility under the EPA Act and the GED to ensure that human health and the environment are always protected. Fulton Hogan will ensure all necessary local government approvals are in place before commencing the proposal.
17	Principle of polluter pays	Persons who generate pollution and waste should bear the cost of containment, avoidance and abatement.	As part of their existing operations through Victoria and Australia as well as for the current proposal, Fulton Hogan have committed significant resources to ensure pollution of the environment is avoided and waste is managed appropriately.
18	Principle of waste management hierarchy	Waste should be managed in accordance with the following order of preference, so far as reasonably practicable— (a) avoidance; (b) reuse; (c) recycling; (d) recovery of energy; (e) containment; (f) waste disposal.	The proposal includes the recycling of waste materials (RAP and glass) into a valuable material for use in road-making. The DLA directly addresses the waste hierarchy in Section 10.1. The site will utilise RAP and waste glass to create saleable road paving and construction materials, embracing the environmental protection principles of the EPA Act and reversing the waste hierarchy by taking waste material disposed from several sources and treating them to be beneficially reused by others.
19	Principle of evidence-based decision making	Actions or decisions under this Act should be based on the best available evidence in the circumstances that is relevant and reliable.	A considerable amount of evidence has been included in the DLA to meet the EPA requirements of assessment. Technical assessments examining risks associated with air quality, noise and odour impacts have been included in the

Principle No.	Principle Title	Principle Description	Summary Statement addressing Principle
			DLA (and provide evidence that risks are likely to be low). Section 16 of the DLA provides an assessment of the proposal against best available techniques and technology (BATT) for asphalt plants and for waste treatment and demonstrates the proposal meets BATT.
20	Precautionary principle	If there exist threats of serious or irreversible harm to human health or the environment, lack of full scientific certainty should not be used as a reason for postponing measures to prevent or minimise those threats.	Assessments undertaken as part of the DLA have applied the precautionary principle. Technical assessment such as air, noise and odour assessments have made conservative assumptions to ensure that where there is uncertainty, the worst-case credible scenario is used as an input to the assessment/s. The relevant safeguards and management measures within the DLA will be included in the site-specific Environmental Management Plan (EMP) (or equivalent) and a site-specific Environmental Control Plan (ECP). The DLA provides a draft EMP which describes the management and mitigation measures that are applied at the site to avoid and minimise risks to human health and the environment.
21	Principle of equity	(1) All people are entitled to live in a safe and healthy environment irrespective of their personal attributes or location. (2) People should not be disproportionately affected by harm or risks of harm to human health and the environment. (3) The present generation should ensure the state of the environment is maintained or enhanced for the benefit of future generations.	This principle is embedded in the application and assessment. All potentially impacted sensitive receptors near the facility have been treated equally. All potentially affected residences have been directly consulted. The proposal addresses future environmental impact by diverting RAP and waste glass from landfill and upgrading to a more efficient burner which both reduce GHG emissions.

Principle No.	Principle Title	Principle Description	Summary Statement addressing Principle
22	Principle of accountability	Members of the public should— (a) have access to reliable and relevant information in appropriate forms to facilitate a good understanding of issues of harm or risks of harm to human health and the environment and of how decisions are made under this Act; and (b) be engaged and given opportunities to participate in decisions made under this Act, where appropriate to do so; and (c) have their interests taken into account in decisions made under this Act.	Section 2 of the DLA describes stakeholder and community engagement undertaken as part of the DLA which also involved engagement with potentially affected nearby residents. Fulton Hogan has engaged with residents and industry operators up to 1 km from the site via letter drop during the week commencing 20/12/2021. The letter (Appendix C of the DLA) advises recipients of Fulton Hogan's intention to establish an asphalt batch plant on the site. The letter gives an overview of the proposal as well as the potential environmental risks from the plant. An overview of management measures and safeguards proposed to manage potential risks was also provided. The letter provides contact details and requests the recipient make contact if they have queries or interest regarding the proposal. At the time of writing Fulton Hogan had not received feedback from the community. If feedback is received then Fulton Hogan will consult further to understand the nature and details of any issues raised and provide further information to assist the respondent. Fulton Hogan are committed to developing trusting and honest relationships with the local community and to engaging with them, listening to what they say, and being open to alternative solutions and ways of doing things.
23	Principle of conservation	Biological diversity and ecological integrity should be protected for purposes that include the protection of human health	The site does not contain any native vegetation that is protected and is on agricultural land. The potential for any

Principle No.	Principle Title	Principle Description	Summary Statement addressing Principle
			impacts on biodiversity values and /or ecological integrity is minor.

2.5. Feedstock material - sand

EPA request:

5. Table 6-1 of the application document lists sand of one of the import materials. The description in section 6.3 after Table 6.1 does not mention much about sand. Provide information on sand such as proposed storage quantity, quantity of sand to be used in the proposed activities versus the proposed quantity of crushed glass.

SPM / Fulton Hogan Response:

Approximate tonnes per annum (tpa) sand used:

- For 50,000 tpa asphalt production: 15,000 tpa of sand (i.e. 30%)
- For 100,000 tpa asphalt production: 30,000 tpa sand (i.e. 30%)

Maximum amount of sand stored on site will be 350 tonnes (i.e., the approximate capacity of an individual storage bunker)

Approximate amount of sand, derived from glass, to be used in batching is 2,500 tonne based on 50,000 tpa asphalt production (or 5,000 tpa based on 100,000 tpa asphalt production); that is, approximately 5% of asphalt feedstock materials will be sand from recycled glass.

2.6. Feedstock material - aggregates and fillers

EPA request:

6. The proposed storage quantities for aggregate and fillers are not provided in the application document. Provide the proposed storage quantities for aggregate and fillers.

SPM / Fulton Hogan Response:

Maximum amounts of aggregates stored on the site at any one time (within the 8 x covered storage bays described in the DLA Section 6.4.2) is approximately 2,400 tonnes; based on 300 tonnes per bay.

Maximum amounts of filler (hydrated lime/fly ash) stored on site is a function of the silo capacities. There are two silos proposed;

- Foreign/Import Filler Silo which has a capacity of 30T (24M^3 – assuming 0.8 density)
- Reclaimed Filler Silo which has a capacity of 20T (16M^3 – assuming 0.8 density).

Therefore, the maximum amount of filler on site at any one time will be 50T (40M3 – assuming 0.8 density).

2.7. Asphalt batching process

EPA request:

7. Section 6.5.2 of the application document provides a brief description of the asphalt batching process. More information is required in this section to allow EPA to understand the proposed technology. Provide a detailed description of the asphalt batching process including individual unit processes and operating temperatures.

SPM / Fulton Hogan Response:

A detailed description (including description of each zone / unit of the plant and operating temperatures) is provided in the 'Theory of Operation' document at Attachment A. To avoid confusion it should be note that where the Theory of Operation document refers to 'asphalt cement' (AC) this is the equivalent of 'bitumen' referred to in the DLA.

Also, it is noted that in regards the reference to 'optional liquid additives' in the Theory of Operation document, as per operations at the existing Warrnambool facility, the proposal includes a liquid additive called Evotherm PC 1770 which is added to bitumen as described in the theory of operation document. A safety data sheet and information sheet is provided for Evotherm PC 1770 at Attachment B. The product is supplied/stored in IBC's (each IBC has a 1,000 L capacity) and the maximum number of IBC's on site at any one time would be two. The additive would be stored in an approved bunded dangerous goods container. The additive is not used for all mixes and is only by special request/mix design from our customers. The additive is used at approximately 2-3% of Bitumen content (which in-turn comprises approximately 6% of the asphalt mix); i.e., approximately 0.18% of total asphalt mix. It is expected that the facility will use up to approximately 4,000L per annum of the additive, based around annual production volumes of 100,000 tonnes.

2.8. Certificate of the registration of a company

EPA request:

8. Provide Fulton Hogan Industries Pty Ltd's certificate of the registration of a company

SPM / Fulton Hogan Response:

Certificate is provided at Attachment C.

ATTACHMENT A – ASTEC Theory of Operation – Asphalt Batch Plant

THEORY OF OPERATION

Table of Contents

List of Figures

Glossary

Asphaltic Concrete - Asphalt which is batched from virgin aggregates, reclaimed asphalt pavement (RAP), additives, fillers and bitumen

Asphalt Cement (AC) - Bitumen which is used as binder for asphalt

V1.3 2022-05-11

This page intentionally left blank.

GENERAL DESCRIPTION

This document explains how the various components of a typical asphaltic concrete batch tower facility function together to produce asphaltic concrete.

Facility zones include:

1. Cold Feed Zone
2. AC Feed Zone
3. Drying Zone
4. Batch Mixing Zone
5. Filtration Zone
6. Storage & Loadout Zone
7. Control Center

Each zone performs a specific function in the process of combining virgin aggregate, reclaimed asphalt pavement (RAP), additives and fillers with asphalt cement (AC) to produce asphaltic concrete for paving applications (Figure 1).

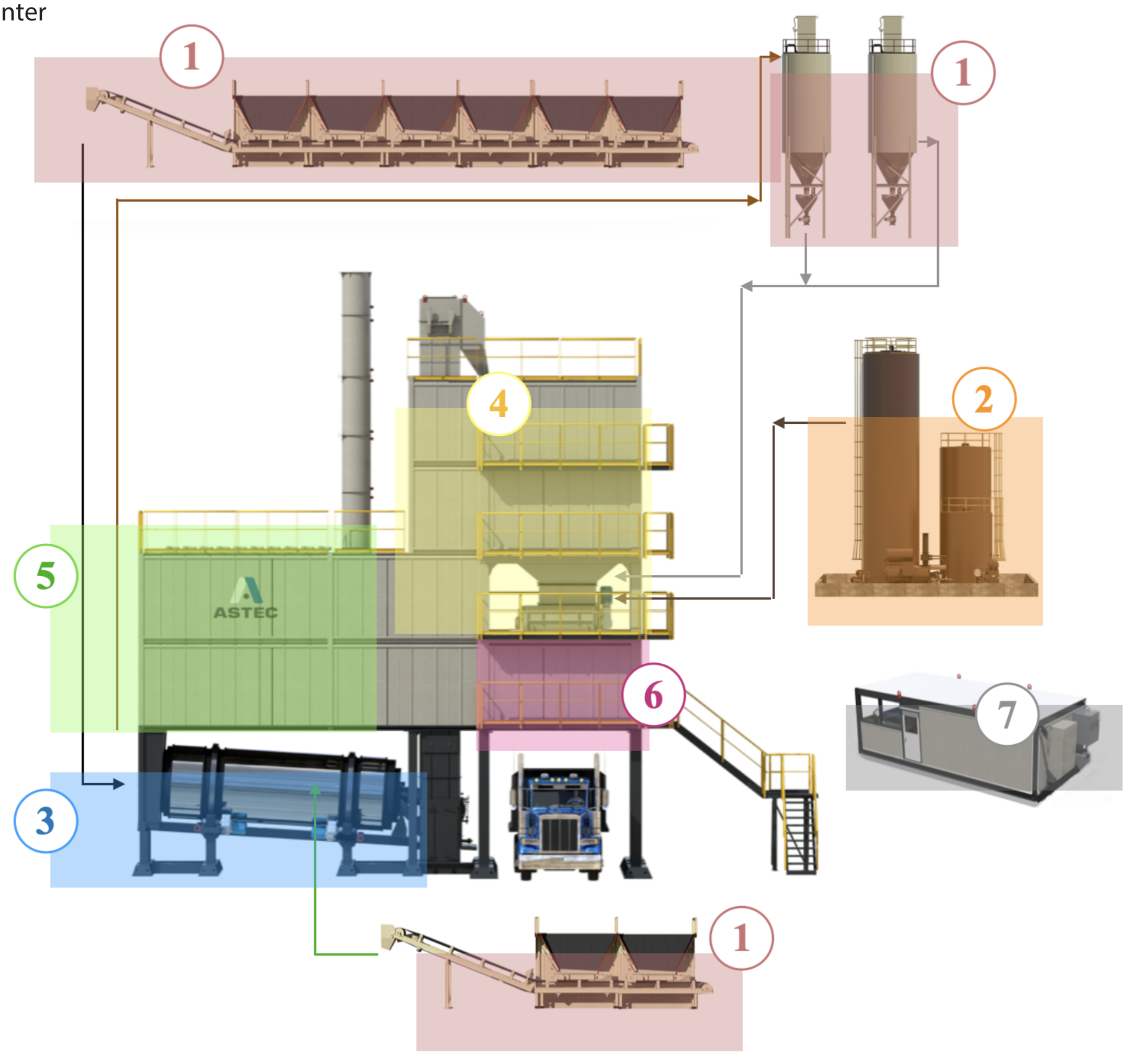


Figure 1. Asphaltic concrete batch tower facility layout by zones

Cold Feed Zone ①

The process of making asphaltic concrete begins with stockpiled virgin aggregate. Various grades of aggregate are stockpiled so that a variety of asphaltic concrete mixes can be produced. A front-end loader transfers each grade of aggregate from the stockpile to a cold feed bin for that grade. Belt feeders under the bins deposit aggregate for the mix onto a collecting conveyor beneath the feeders at a pre-determined rate.

The collecting conveyor carries the aggregate mixture to a vibrating screen deck (scalping screen) mounted over an inclined belt conveyor. The scalping screen removes oversized material. Aggregate that passes through the screen is then deposited on an inclined belt conveyor. A weigh scale (weighbridge) on the inclined conveyor weighs the aggregate as it passes over it. The weighbridge transmits instantaneous mass flow rates to the computer in the control system. The computer regulates the speed of the cold feed belt feeders to match the desired production rate. The inclined conveyor transfers the aggregate to the dryer drum inlet chute.

A batch facility that uses RAP uses separate stockpiles and a separate system of feed bins and belt conveyors to move the RAP to an external recycle system, if so equipped.

The Cold Feed Zone may also include additive silos that store aggregate dust, mineral filler, and lime. Transfer screws deliver these materials to the batch tower according to the mix design. Foreign filler / lime/ is added to the system by the bulk carrier. A Silo top filter on the silos ensures clean exhaust of the air blown for transport. All processes are done on Ambient temperatures.

AC Feed Zone ②

AC is a strong, versatile weather and chemical-resistant binding material used in the production of asphaltic concrete. AC is stored in vertical or horizontal tanks which are heated to maintain the AC at a desired temperature (160 Deg C usually) and viscosity. The temperature is maintained by using electric heating elements.

A positive displacement pump supplies liquid AC to the batch tower. AC is weighed in kgs as per batch designs and then a second pump transfers the weighed bitumen in to the mixer unit. During Warm mix production water is added in to the line to create bitumen foam thru a special foaming gun before mixing in to the mixer unit.

An optional liquid additive tank stores liquid anti-strip additive which can be added to the AC to enhance adhesion with the aggregate mixture.

Liquid additives could also comprise of special additives which are used for numerous different types of mixes common in the asphalting world.

Drying Zone ③

Rotary dryer drums or dryer/drum mixers are used to dry and heat aggregate. As the aggregate enters the drum, flights in the drum shower the aggregate through hot gases from the burner to heat and dry the mixture. The angle of the rotating drum moves the aggregate from one end of the drum to the other to be discharged. In a counterflow drum, the material flows in the direction opposite the flow of hot gases.

Patented flights and burner technology on the dryer ensures a a clean stack.

Once the aggregate leaves the drum (usually around 120-160Deg C) , it enters a bucket elevator. The bucket elevator conveys the aggregate vertically to the top of the batch tower.

Batch Mixing & Loadout Zone ④

Dried and heated aggregates are conveyed by bucket elevator to the top of the batch tower and are discharged into the tower vibrating screen. The vibrating screen sorts the aggregates according to the mesh openings of various screen decks and directs the aggregates into hot bins classified by size. Oversized materials are directed to a reject chute.

The hot bins discharge individually using single-clam gates positioned above the aggregate weigh hopper. A predetermined amount of material (a "dose") is drawn from each hot aggregate bin based on the job mix design. The aggregate weigh hopper uses four load cells, one on each corner, to weigh the aggregates. The total combined weights of each material make up a full batch.

Once the weight needed for the mix is reached, clam gates beneath the hopper deposit the dose of aggregate materials into the empty (running) twin-shaft mixer to begin the dry-mix cycle.

As the mixer begins the dry-mix cycle, a dose of liquid AC is drawn from a heated storage tank into the AC weigh bucket. The AC weigh bucket is suspended by three load cells to weigh the AC. Once the specified amount is reached, the weigh bucket empties the dose into a spray bar manifold on the mixer. The spray bar manifold distributes the hot liquid AC across the bed of blended dry material inside the mixer to begin the wet-mix cycle.

Liquid AC may be routed through a warm mix system mounted on the batch tower in order to produce warm mix asphalt.

The mixer combines the hot, dried virgin aggregates with the liquid AC to make asphaltic concrete. RAP and dry additives may also be added to the mix. If dry additives are used, the material is introduced into the mixer through a separate inlet.

If RAP is used, there are several ways it can be introduced into the mixing process. One option is to introduce RAP directly into the special entry on the dryer drum, where it is gradually heated and transfered thru the hot elevator in to the weighing process described above.

While using RAP we bypass the vibrating screen and the aggregates + RAP goes directly into a hot storage bin. The aggregate/RAP mixture is weighed as one aggregate, but the amount of added AC must be adjusted to account for the AC content of the RAP.

A complete batch cycle begins with blending the dry aggregates together in the mixer for a short dry-mix period (2 to 5 seconds). The liquid AC is then added to the dry aggregate (120-160 Deg C, depending on mix to be produced) for a longer wet-mix period. A complete batch cycle may be as short as 30 seconds or as long as 60 seconds. A 45-second batch cycle yields an average of 80 batches per hour.

The batch cycle ends with the asphaltic concrete being discharged through a central slide gate or dual slide gates, typically into a haul truck positioned underneath the mixer. The mix is delivered at 125-160 Deg C depending on the type of mix.

System control software tracks the loadout process and prints tickets for the amount of asphaltic concrete loaded into the truck.

Asphalt fumes (blue smoke) generated during the mixing process are drawn into the combustion zone of the dryer drum where a portion of the fumes are incinerated by the burner.

When using RAP, the RAP scavenge system evacuates the steam that comes from each batch. Gases scavenged from the steam expansion are directed to a dispersion manifold and introduced into the combustion zone of the dryer.

Filtration Zone 5

A baghouse is the environmental control system for an asphaltic concrete production facility. Exhaust gases are pulled into and through the baghouse by an exhaust fan. The exhaust gases enter the baghouse (at 125DegC) through an inertial separator, a knockout box which removes dust particles greater than 75 microns from the gas stream produced during the mixing process. These coarse particles are usually directed to the bucket elevator via screw conveyor to be returned to the mixing process along with the aggregates going to the tower vibrating screen. The bags are cleaned automatically by a reverse flow of clean air at programmed intervals. Clean air leaves the system at temp. less than 115 Deg C.

An air compressor provides compressed air for pneumatic systems used throughout the facility as well as the cleaning system in a pulse jet baghouse.

The baghouse uses felt bags to filter fine particulate matter from the dryer exhaust gases. The baghouse exhaust fan utilizes either a variable frequency drive (VFD) which reduces energy consumption and to modulate air flow and maintain burner suction in the dryer drum. Filtered air is discharged to the environment through the exhaust stack at less than 115 Deg C

The scavenge system uses ducts connected to the baghouse draft air system from material transfer points on the tower to create a suction (negative pressure) that will prevent dust leakage. All of the fugitive dust captured by the scavenge system is routed to the baghouse. Dust that is not captured will settle within the tower components and be returned to the mix process.

Dust collected in the baghouse hopper is either directed to the bucket elevator via screw conveyor or into a dry additive silo for storage. When the fines exit the silo, they are weighed by the weigh pot and then conveyed to the batch mixed via screw conveyor. Trapped excess dust is removed from the system.

Storage & Loadout Zone (Custom) 6

If a storage system is used, the asphaltic concrete mix discharges from the batch mixer into a transfer chute feeding a storage silo under the mixer.

The storage silos have partitions to store different type of mixes in them. They are closed and fully insulated to retain the heat of the hot mix stored in them. The storage bins are loaded and based on the need the asphaltic concrete mix, the mix is drawn out of the silos.

Insulation around the storage silos conserves heat energy and reduces the energy requirement on the asphalt plant. Electrically heated silo bottoms ensure smooth flow of the hot mix upon storage and reduces wastage of natural resources. Long term storage silos offer longer time for hot mix storage.

The hot material usually at 120-160 Deg C is dropped from the storage silo into a waiting dump truck . By dropping material in batches rather than a steady stream, segregation of material is reduced. Storage silos hold asphaltic concrete until the mixture is loaded into haul trucks for transport to the job site. Mix may be stored for several hours depending on the silo design. Storage silos also load delivery trucks in multiple batches to prevent segregation.

System control software tracks the loadout process and prints tickets for the amount of asphaltic concrete loaded into the truck.

Control Center 7

The control center provides the facility operator with a computer controls system to remotely manage and monitor most operations of the asphaltic concrete production facility including:

- Mix volumes
- Asphalt cement
- Temperatures
- Product output data
- Equipment performance
- Fault detection

GENERAL LAYOUT

1. Cold Feed Zone
2. AC Feed Zone
3. Drying Zone
4. Batch Mixing & Loadout Zone
5. Filtration Zone
6. Storage & Loadout Zone
7. Control Center

Each zone performs a specific function in the process of combining virgin aggregate, reclaimed asphalt pavement (RAP), additives and fillers with asphalt cement (AC) to produce asphaltic concrete for paving applications (Figure 1).

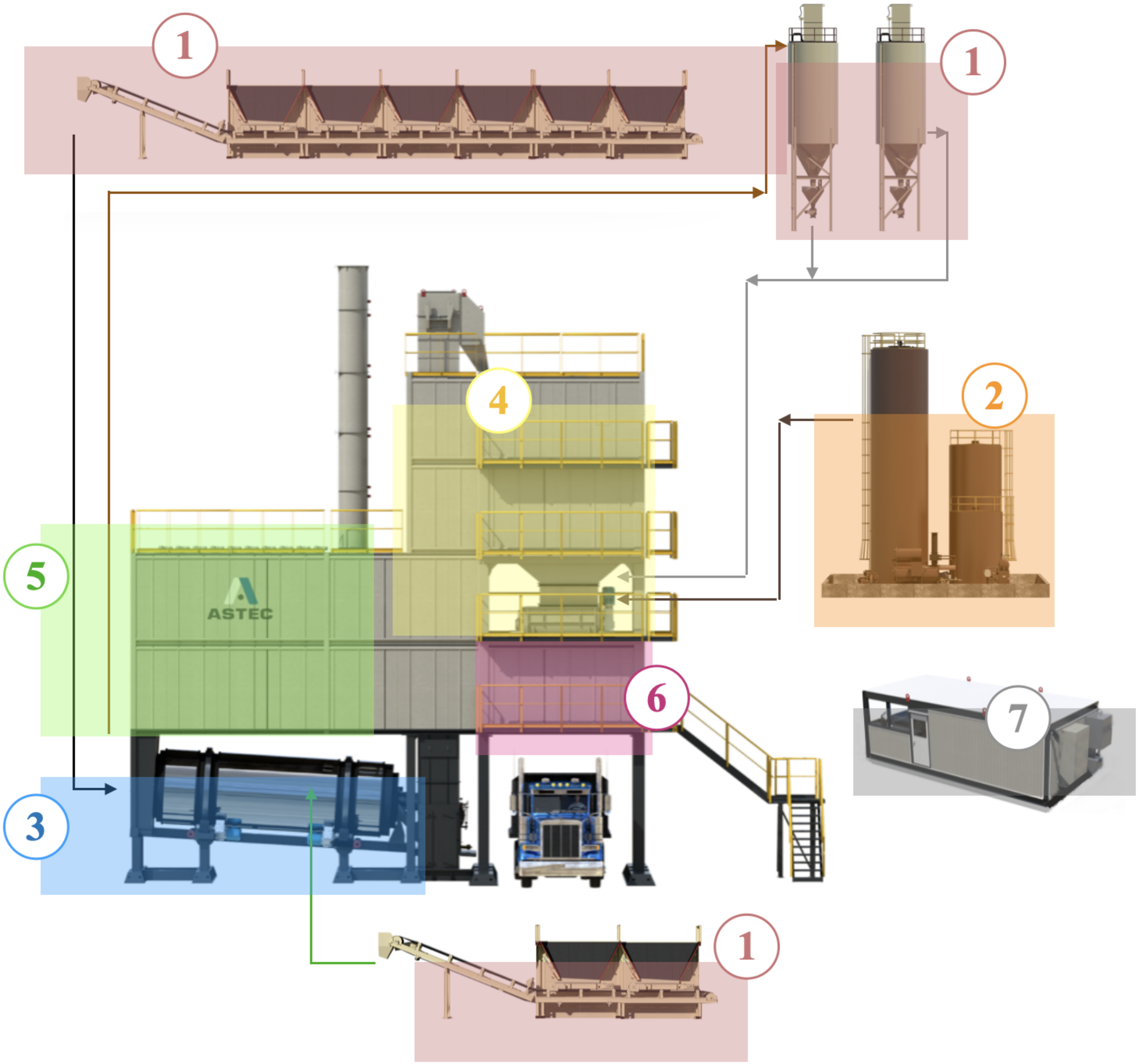


Figure 2. Asphaltic concrete batch tower facility layout

NORMAL FLOW & TEMPERATURE

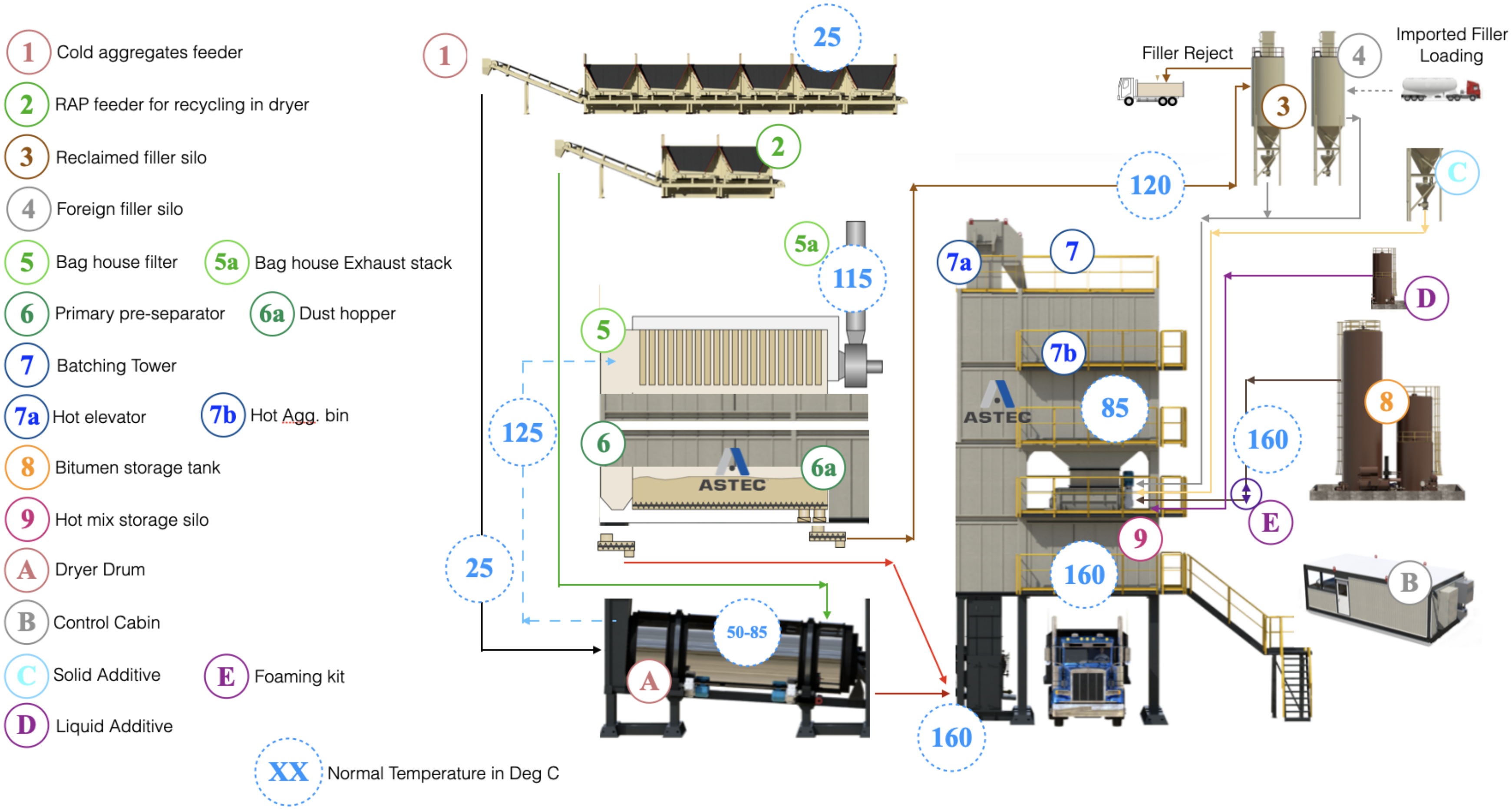


Figure 3. Asphaltic concrete batch tower facility general flow sketch and temperatures

ATTACHMENT B – Evotherm PC-1770 Safety Data Sheet and Information sheet

Evotherm PC-1770

Brenntag (Brenntag Australia)

Chemwatch Hazard Alert Code: 3

Chemwatch: **51-70524**
Version No: **3.1**
Safety Data Sheet according to WHS Regulations (Hazardous Chemicals) Amendment 2020 and ADG requirements

Issue Date: **29/05/2020**
Print Date: **23/06/2022**
S.GHS.AUS.EN

SECTION 1 Identification of the substance / mixture and of the company / undertaking

Product Identifier

Product name	Evotherm PC-1770
Chemical Name	Not Applicable
Synonyms	Not Available
Proper shipping name	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S. (contains fatty amine derivative)
Chemical formula	Not Applicable
Other means of identification	Not Available

Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses	Asphalt additive.

Details of the supplier of the safety data sheet

Registered company name	**Brenntag (Brenntag Australia)**	**Ingevity**
Address	260 - 262 Highett Road Highett Victoria 3190 Australia	5255 Virginia Avenue North Charleston South Carolina 29406-3615 United States
Telephone	+61 3 9559 8333	+1 800 458 4034
Fax	Not Available	Not Available
Website	http://www.brenntag.com	http://www.ingevity.com/
Email	info-aus@brenntag-asia.com	gary.rorke@ingevity.com

Emergency telephone number

Association / Organisation	**Ingevity**	**CHEMWATCH EMERGENCY RESPONSE**
Emergency telephone numbers	+1 800 424 9300	+61 1800 951 288
Other emergency telephone numbers	Not Available	+61 3 9573 3188

Once connected and if the message is not in your prefered language then please dial 01

SECTION 2 Hazards identification

Classification of the substance or mixture

Poisons Schedule	Not Applicable
Classification [1]	Skin Corrosion/Irritation Category 1C, Serious Eye Damage/Eye Irritation Category 1, Sensitisation (Skin) Category 1A, Hazardous to the Aquatic Environment Long-Term Hazard Category 1, Corrosive to Metals Category 1
Legend:	*1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI*

Label elements

Hazard pictogram(s)	
Signal word	**Danger**

Hazard statement(s)

H314	Causes severe skin burns and eye damage.
H317	May cause an allergic skin reaction.
H410	Very toxic to aquatic life with long lasting effects.
H290	May be corrosive to metals.

Precautionary statement(s) Prevention

P260	Do not breathe mist/vapours/spray.
P264	Wash all exposed external body areas thoroughly after handling.

P280	Wear protective gloves, protective clothing, eye protection and face protection.
P234	Keep only in original packaging.
P273	Avoid release to the environment.
P272	Contaminated work clothing should not be allowed out of the workplace.

Precautionary statement(s) Response

P301+P330+P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303+P361+P353	IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water [or shower].
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER/doctor/physician/first aider.
P302+P352	IF ON SKIN: Wash with plenty of water.
P363	Wash contaminated clothing before reuse.
P333+P313	If skin irritation or rash occurs: Get medical advice/attention.
P362+P364	Take off contaminated clothing and wash it before reuse.
P390	Absorb spillage to prevent material damage.
P391	Collect spillage.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.

Precautionary statement(s) Storage

P405	Store locked up.

Precautionary statement(s) Disposal

P501	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.

Not Applicable

SECTION 3 Composition / information on ingredients

Substances

See section below for composition of Mixtures

Mixtures

CAS No	%[weight]	Name
Not Available	>60	fatty amine derivative
Legend:	*1. Classified by Chemwatch; 2. Classification drawn from HCIS; 3. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 4. Classification drawn from C&L; * EU IOELVs available*	

SECTION 4 First aid measures

Description of first aid measures

Eye Contact	If this product comes in contact with the eyes: ▸ Immediately hold eyelids apart and flush the eye continuously with running water. ▸ Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids. ▸ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. ▸ Transport to hospital or doctor without delay. ▸ Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
Skin Contact	If skin or hair contact occurs: ▸ Immediately flush body and clothes with large amounts of water, using safety shower if available. ▸ Quickly remove all contaminated clothing, including footwear. ▸ Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre. ▸ Transport to hospital, or doctor.
Inhalation	▸ If fumes or combustion products are inhaled remove from contaminated area. ▸ Lay patient down. Keep warm and rested. ▸ Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures. ▸ Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary. ▸ Transport to hospital, or doctor. ▸ Inhalation of vapours or aerosols (mists, fumes) may cause lung oedema. ▸ Corrosive substances may cause lung damage (e.g. lung oedema, fluid in the lungs). ▸ As this reaction may be delayed up to 24 hours after exposure, affected individuals need complete rest (preferably in semi-recumbent posture) and must be kept under medical observation even if no symptoms are (yet) manifested. ▸ Before any such manifestation, the administration of a spray containing a dexamethasone derivative or beclomethasone derivative may be considered. **This must definitely be left to a doctor or person authorised by him/her.** (ICSC13719)
Ingestion	▸ For advice, contact a Poisons Information Centre or a doctor at once. ▸ Urgent hospital treatment is likely to be needed. ▸ If swallowed do **NOT** induce vomiting. ▸ If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration. ▸ Observe the patient carefully.

Continued...

	- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. - Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink. - Transport to hospital or doctor without delay.

Indication of any immediate medical attention and special treatment needed

For acute or short-term repeated exposures to highly alkaline materials:

- Respiratory stress is uncommon but present occasionally because of soft tissue edema.
- Unless endotracheal intubation can be accomplished under direct vision, cricothyroidotomy or tracheotomy may be necessary.
- Oxygen is given as indicated.
- The presence of shock suggests perforation and mandates an intravenous line and fluid administration.
- Damage due to alkaline corrosives occurs by liquefaction necrosis whereby the saponification of fats and solubilisation of proteins allow deep penetration into the tissue.

Alkalis continue to cause damage after exposure.
INGESTION:

- Milk and water are the preferred diluents

No more than 2 glasses of water should be given to an adult.

- Neutralising agents should never be given since exothermic heat reaction may compound injury.

* Catharsis and emesis are absolutely contra-indicated.
* Activated charcoal does not absorb alkali.
* Gastric lavage should not be used.

Supportive care involves the following:

- Withhold oral feedings initially.
- If endoscopy confirms transmucosal injury start steroids only within the first 48 hours.
- Carefully evaluate the amount of tissue necrosis before assessing the need for surgical intervention.
- Patients should be instructed to seek medical attention whenever they develop difficulty in swallowing (dysphagia).

SKIN AND EYE:

- Injury should be irrigated for 20-30 minutes.

Eye injuries require saline. [Ellenhorn & Barceloux: Medical Toxicology]

SECTION 5 Firefighting measures

Extinguishing media

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

Special hazards arising from the substrate or mixture

Fire Incompatibility	- Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Advice for firefighters

Fire Fighting	- Alert Fire Brigade and tell them location and nature of hazard. - Wear full body protective clothing with breathing apparatus. - Prevent, by any means available, spillage from entering drains or water course. - Use fire fighting procedures suitable for surrounding area. - **Do not** approach containers suspected to be hot. - Cool fire exposed containers with water spray from a protected location. - If safe to do so, remove containers from path of fire. - Equipment should be thoroughly decontaminated after use.
Fire/Explosion Hazard	- Combustible. - Slight fire hazard when exposed to heat or flame. - Heating may cause expansion or decomposition leading to violent rupture of containers. - On combustion, may emit toxic fumes of carbon monoxide (CO). - May emit acrid smoke. - Mists containing combustible materials may be explosive. Combustion products include: carbon dioxide (CO_2) nitrogen oxides (NOx) other pyrolysis products typical of burning organic material. May emit corrosive fumes.
HAZCHEM	2X

SECTION 6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	- Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material. - Check regularly for spills and leaks. - Clean up all spills immediately. - Avoid breathing vapours and contact with skin and eyes. - Control personal contact with the substance, by using protective equipment. - Contain and absorb spill with sand, earth, inert material or vermiculite. - Wipe up. - Place in a suitable, labelled container for waste disposal.

Continued...

Major Spills	‣ Clear area of personnel and move upwind. ‣ Alert Fire Brigade and tell them location and nature of hazard. ‣ Wear full body protective clothing with breathing apparatus. ‣ Prevent, by any means available, spillage from entering drains or water course. ‣ Consider evacuation (or protect in place). ‣ Stop leak if safe to do so. ‣ Contain spill with sand, earth or vermiculite. ‣ Collect recoverable product into labelled containers for recycling. ‣ Neutralise/decontaminate residue (see Section 13 for specific agent). ‣ Collect solid residues and seal in labelled drums for disposal. ‣ Wash area and prevent runoff into drains. ‣ After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using. ‣ If contamination of drains or waterways occurs, advise emergency services.

Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	‣ **DO NOT** allow clothing wet with material to stay in contact with skin ‣ Avoid all personal contact, including inhalation. ‣ Wear protective clothing when risk of exposure occurs. ‣ Use in a well-ventilated area. ‣ Avoid contact with moisture. ‣ Avoid contact with incompatible materials. ‣ When handling, **DO NOT** eat, drink or smoke. ‣ Keep containers securely sealed when not in use. ‣ Avoid physical damage to containers. ‣ Always wash hands with soap and water after handling. ‣ Work clothes should be laundered separately. Launder contaminated clothing before re-use. ‣ Use good occupational work practice. ‣ Observe manufacturer's storage and handling recommendations contained within this SDS. ‣ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
Other information	‣ **DO NOT** store near acids, or oxidising agents ‣ No smoking, naked lights, heat or ignition sources. ‣ Store in original containers. ‣ Keep containers securely sealed. ‣ No smoking, naked lights or ignition sources. ‣ Store in a cool, dry, well-ventilated area. ‣ Store away from incompatible materials and foodstuff containers. ‣ Protect containers against physical damage and check regularly for leaks. ‣ Observe manufacturer's storage and handling recommendations contained within this SDS.

Conditions for safe storage, including any incompatibilities

Suitable container	‣ Lined metal can, lined metal pail/ can. ‣ Plastic pail. ‣ Polyliner drum. ‣ Packing as recommended by manufacturer. ‣ Check all containers are clearly labelled and free from leaks. For low viscosity materials ‣ Drums and jerricans must be of the non-removable head type. ‣ Where a can is to be used as an inner package, the can must have a screwed enclosure. For materials with a viscosity of at least 2680 cSt. (23 deg. C) and solids (between 15 C deg. and 40 deg C.): ‣ Removable head packaging; ‣ Cans with friction closures and ‣ low pressure tubes and cartridges may be used. - Where combination packages are used, and the inner packages are of glass, porcelain or stoneware, there must be sufficient inert cushioning material in contact with inner and outer packages unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.
Storage incompatibility	‣ Avoid contact with copper, aluminium and their alloys. ‣ Avoid strong acids, acid chlorides, acid anhydrides and chloroformates. ‣ Avoid reaction with oxidising agents

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Not Available

Emergency Limits

Ingredient	TEEL-1	TEEL-2	TEEL-3
Evotherm PC-1770	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
fatty amine derivative	Not Available	Not Available

Continued...

Exposure controls

Appropriate engineering controls

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
The basic types of engineering controls are:
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
Employers may need to use multiple types of controls to prevent employee overexposure.

General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in special circumstances. If risk of overexposure exists, wear approved respirator. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection. Provide adequate ventilation in warehouses and enclosed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapours, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion)	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Personal protection

Eye and face protection

- Chemical goggles.
- Full face shield may be required for supplementary but never for primary protection of eyes.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

Skin protection

See Hand protection below

Hands/feet protection

- Wear chemical protective gloves, e.g. PVC.
- Wear safety footwear or safety gumboots, e.g. Rubber
- When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

NOTE:

- The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
- Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.
Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:
· frequency and duration of contact,
· chemical resistance of glove material,
· glove thickness and
· dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).
· When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
· When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
· Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use.
· Contaminated gloves should be replaced.
As defined in ASTM F-739-96 in any application, gloves are rated as:

Continued...

	· Excellent when breakthrough time > 480 min · Good when breakthrough time > 20 min · Fair when breakthrough time < 20 min · Poor when glove material degrades For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended. It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times. Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers technical data should always be taken into account to ensure selection of the most appropriate glove for the task. Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example: · Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of. · Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
Body protection	See Other protection below
Other protection	▸ Overalls. ▸ PVC Apron. ▸ PVC protective suit may be required if exposure severe. ▸ Eyewash unit. ▸ Ensure there is ready access to a safety shower.

Respiratory protection

Type AK-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Required minimum protection factor	Maximum gas/vapour concentration present in air p.p.m. (by volume)	Half-face Respirator	Full-Face Respirator
up to 10	1000	AK-AUS / Class1 P2	-
up to 50	1000	-	AK-AUS / Class 1 P2
up to 50	5000	Airline *	-
up to 100	5000	-	AK-2 P2
up to 100	10000	-	AK-3 P2
100+			Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- Cartridge respirators should never be used for emergency ingress or in areas of unknown vapour concentrations or oxygen content.
- The wearer must be warned to leave the contaminated area immediately on detecting any odours through the respirator. The odour may indicate that the mask is not functioning properly, that the vapour concentration is too high, or that the mask is not properly fitted. Because of these limitations, only restricted use of cartridge respirators is considered appropriate.
- Cartridge performance is affected by humidity. Cartridges should be changed after 2 hr of continuous use unless it is determined that the humidity is less than 75%, in which case, cartridges can be used for 4 hr. Used cartridges should be discarded daily, regardless of the length of time used

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Dark amber coloured alkaline liquid with amine like odour; partly mixes with water.

Physical state	Liquid	**Relative density (Water = 1)**	0.97
Odour	Not Available	**Partition coefficient n-octanol / water**	Not Available
Odour threshold	Not Available	**Auto-ignition temperature (°C)**	365-375
pH (as supplied)	Not Available	**Decomposition temperature**	Not Available
Melting point / freezing point (°C)	<-30 (freezing pt.)	**Viscosity (cSt)**	130.93 @25C
Initial boiling point and boiling range (°C)	>200	**Molecular weight (g/mol)**	Not Applicable
Flash point (°C)	>266 (PMCC)	**Taste**	Not Available
Evaporation rate	Not Available	**Explosive properties**	Not Available
Flammability	Not Applicable	**Oxidising properties**	Not Available
Upper Explosive Limit (%)	Not Available	**Surface Tension (dyn/cm or mN/m)**	Not Available
Lower Explosive Limit (%)	Not Available	**Volatile Component (%vol)**	Not Available
Vapour pressure (kPa)	Not Available	**Gas group**	Not Available
Solubility in water	Partly miscible	**pH as a solution (Not Available%)**	10-12 (15%)
Vapour density (Air = 1)	Not Available	**VOC g/L**	Not Available

Continued...

SECTION 10 Stability and reactivity

Reactivity	See section 7
Chemical stability	‣ Unstable in the presence of incompatible materials. ‣ Product is considered stable. ‣ Hazardous polymerisation will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 Toxicological information

Information on toxicological effects

Inhaled	Inhaling corrosive bases may irritate the respiratory tract. Symptoms include cough, choking, pain and damage to the mucous membrane.
Ingestion	The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.
Skin Contact	The material can produce chemical burns following direct contact with the skin. Open cuts, abraded or irritated skin should not be exposed to this material Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
Eye	The material can produce chemical burns to the eye following direct contact. Vapours or mists may be extremely irritating.
Chronic	Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

Evotherm PC-1770	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
fatty amine derivative	**TOXICITY**	**IRRITATION**
	Not Available	Not Available
Legend:	*1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2.* Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances*	

Acute Toxicity	✗	**Carcinogenicity**	✗
Skin Irritation/Corrosion	✓	**Reproductivity**	✗
Serious Eye Damage/Irritation	✓	**STOT - Single Exposure**	✗
Respiratory or Skin sensitisation	✓	**STOT - Repeated Exposure**	✗
Mutagenicity	✗	**Aspiration Hazard**	✗

Legend: ✗ *– Data either not available or does not fill the criteria for classification*
✓ *– Data available to make classification*

SECTION 12 Ecological information

Toxicity

Evotherm PC-1770	**Endpoint**	**Test Duration (hr)**	**Species**	**Value**	**Source**
	Not Available	Not Available	Not Available	Not Available	Not Available
fatty amine derivative	**Endpoint**	**Test Duration (hr)**	**Species**	**Value**	**Source**
	Not Available	Not Available	Not Available	Not Available	Not Available
Legend:	*Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - Aquatic Toxicity 4. US EPA, Ecotox database - Aquatic Toxicity Data 5. ECETOC Aquatic Hazard Assessment Data 6. NITE (Japan) - Bioconcentration Data 7. METI (Japan) - Bioconcentration Data 8. Vendor Data*				

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.
Wastes resulting from use of the product must be disposed of on site or at approved waste sites.
Prevent, by any means available, spillage from entering drains or water courses.
DO NOT discharge into sewer or waterways.

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air

Continued...

Ingredient	Persistence: Water/Soil	Persistence: Air
	No Data available for all ingredients	No Data available for all ingredients

Bioaccumulative potential

Ingredient	Bioaccumulation
	No Data available for all ingredients

Mobility in soil

Ingredient	Mobility
	No Data available for all ingredients

SECTION 13 Disposal considerations

Waste treatment methods

Product / Packaging disposal	▸ Containers may still present a chemical hazard/ danger when empty. ▸ Return to supplier for reuse/ recycling if possible. Otherwise: ▸ If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill. ▸ Where possible retain label warnings and SDS and observe all notices pertaining to the product. Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked. A Hierarchy of Controls seems to be common - the user should investigate: ▸ Reduction ▸ Reuse ▸ Recycling ▸ Disposal (if all else fails) This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. ▸ **DO NOT** allow wash water from cleaning or process equipment to enter drains. ▸ It may be necessary to collect all wash water for treatment before disposal. ▸ In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first. ▸ Where in doubt contact the responsible authority. ▸ Recycle wherever possible. ▸ Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified. ▸ Treat and neutralise at an approved treatment plant. ▸ Treatment should involve: Neutralisation with suitable dilute acid followed by: burial in a land-fill specifically licensed to accept chemical and / or pharmaceutical wastes or Incineration in a licensed apparatus (after admixture with suitable combustible material). ▸ Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

SECTION 14 Transport information

Labels Required

	
Marine Pollutant	
HAZCHEM	2X

Land transport (ADG)

UN number	3267
UN proper shipping name	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S. (contains fatty amine derivative)
Transport hazard class(es)	Class 8 Subrisk Not Applicable
Packing group	III
Environmental hazard	Environmentally hazardous
Special precautions for user	Special provisions 223 274 Limited quantity 5 L

Air transport (ICAO-IATA / DGR)

Continued...

UN number	3267
UN proper shipping name	Corrosive liquid, basic, organic, n.o.s. * (contains fatty amine derivative)
Transport hazard class(es)	ICAO/IATA Class: 8 ICAO / IATA Subrisk: Not Applicable ERG Code: 8L
Packing group	III
Environmental hazard	Environmentally hazardous
Special precautions for user	Special provisions: A3 A803 Cargo Only Packing Instructions: 856 Cargo Only Maximum Qty / Pack: 60 L Passenger and Cargo Packing Instructions: 852 Passenger and Cargo Maximum Qty / Pack: 5 L Passenger and Cargo Limited Quantity Packing Instructions: Y841 Passenger and Cargo Limited Maximum Qty / Pack: 1 L

Sea transport (IMDG-Code / GGVSee)

UN number	3267
UN proper shipping name	CORROSIVE LIQUID, BASIC, ORGANIC, N.O.S. (contains fatty amine derivative)
Transport hazard class(es)	IMDG Class: 8 IMDG Subrisk: Not Applicable
Packing group	III
Environmental hazard	Marine Pollutant
Special precautions for user	EMS Number: F-A, S-B Special provisions: 223 274 Limited Quantities: 5 L

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
fatty amine derivative	Not Available

Transport in bulk in accordance with the ICG Code

Product name	Ship Type
fatty amine derivative	Not Available

SECTION 15 Regulatory information

Safety, health and environmental regulations / legislation specific for the substance or mixture

fatty amine derivative is found on the following regulatory lists

Not Applicable

National Inventory Status

National Inventory	Status
Australia - AIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	Yes
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	Yes
Korea - KECI	Yes
New Zealand - NZIoC	Yes
Philippines - PICCS	Yes
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes

Continued...

National Inventory	Status
Russia - FBEPH	Yes
Legend:	*Yes = All CAS declared ingredients are on the inventory* *No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.*

SECTION 16 Other information

Revision Date	29/05/2020
Initial Date	28/05/2020

SDS Version Summary

Version	Date of Update	Sections Updated
3.1	29/05/2020	Acute Health (inhaled), Acute Health (skin), Acute Health (swallowed), Classification, Ingredients, Supplier Information, Name

Other information

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

Definitions and abbreviations

PC－TWA: Permissible Concentration-Time Weighted Average
PC－STEL: Permissible Concentration-Short Term Exposure Limit
IARC: International Agency for Research on Cancer
ACGIH: American Conference of Governmental Industrial Hygienists
STEL: Short Term Exposure Limit
TEEL: Temporary Emergency Exposure Limit。
IDLH: Immediately Dangerous to Life or Health Concentrations
ES: Exposure Standard
OSF: Odour Safety Factor
NOAEL :No Observed Adverse Effect Level
LOAEL: Lowest Observed Adverse Effect Level
TLV: Threshold Limit Value
LOD: Limit Of Detection
OTV: Odour Threshold Value
BCF: BioConcentration Factors
BEI: Biological Exposure Index
AIIC: Australian Inventory of Industrial Chemicals
DSL: Domestic Substances List
NDSL: Non-Domestic Substances List
IECSC: Inventory of Existing Chemical Substance in China
EINECS: European INventory of Existing Commercial chemical Substances
ELINCS: European List of Notified Chemical Substances
NLP: No-Longer Polymers
ENCS: Existing and New Chemical Substances Inventory
KECI: Korea Existing Chemicals Inventory
NZIoC: New Zealand Inventory of Chemicals
PICCS: Philippine Inventory of Chemicals and Chemical Substances
TSCA: Toxic Substances Control Act
TCSI: Taiwan Chemical Substance Inventory
INSQ: Inventario Nacional de Sustancias Químicas
NCI: National Chemical Inventory
FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

This document is copyright.
Apart from any fair dealing for the purposes of private study, research, review or criticism, as permitted under the Copyright Act, no part may be reproduced by any process without written permission from CHEMWATCH.
TEL (+61 3) 9572 4700.

end of SDS

Evotherm® PC-1770

Warm mix asphalt additive

Evotherm PC-1770
CAS Registry Nos.: Components Are Listed in TSCA

Revised: 05/18/2018

Description and Typical Applications

PC-1770 is an innovative warm mix asphalt technology that includes additives to improve coating, surfactants to enhance aggregate-binder adhesion, and agents to promote workability and compaction. PC-1770 can be added at the asphalt terminal or at the mix plant and is useful for producing warm mix asphalt based on all common formulation ingredients, including modified and unmodified asphalt binders, asphalt rubber, silicate and calcareous aggregates, and RAP materials. PC-1770 warm mixes can be used for all pavement layers and are ideal for dense-graded mixes, SMA mixes, OGFC mixes, polymer modified asphalts, ultra-thin overlays, and asphalt rubber mixes. PC-1770 can be used with a wide variety of asphalts and does not adversely impact the asphalt binder performance grade, including asphalt binders modified with SBS, SBR, or EVA. PC-1770 can also be utilized as a liquid anti-stripping agent.

The use of PC-1770 allows mix producers and pavement contractors to realize temperature reductions of 35 to 50 C (63 to 90 F) compared to conventional HMA. Lower temperatures mean less fuel consumption, lower stack emissions, and less fume and odor generation at the plant and job site. Lower temperatures also mean less binder oxidation, which should result in greater crack resistance and longer pavement service life. Mixes based on Evotherm chemistry meet Marshall and SHRP volumetric design specifications. Additionally, Evotherm warm mixes handle like hot mix and give in-place performance properties meeting or exceeding hot mix asphalt pavement specifications.

Evotherm chemistries are tailored to meet the widely varying demands of warm mix asphalt mixture production and paving operations. PC-1770 meets or exceeds the minimum amine value requirements for use as an adhesion promoter set by many state DOTs (see typical properties section).

Typical Properties*

Physical form	Dark amber liquid
Density	0.97
Specific gravity	8.1
Amine value (mg KOH/g)	>500
Conductivity (µS/cm)	2.2
Dielectric constant	2-10
Viscosity (centipoises)	280–560 at 80 F (27 C) 150–300 at 100 F (38 C) 80–160 at 120 F (49 C)

Recommendations for Use**

Dosage rate	0.25–0.75% by weight asphalt cement
Mixing temperature range	>220 F
Compaction temperature range	>150 F

Benefits

Easy to use
Proven performance
Increased RAP contents without exceeding binder grade specification
100% coating with coarse and fine aggregate for dense-, open-, and gap-graded applications
Reduces fuel consumption and stack emissions by up to 50%
Reduces fumes exposure to workers at plants and job sites
Improves compaction for in-place density at 35-50 C (63-90 F) lower temperature than HMA
Provides exceptional moisture resistance and high TSR values

*All measurements are conducted at 25 C (77 F)

**Values reported do not constitute a specification for the PC-1770 additive package.

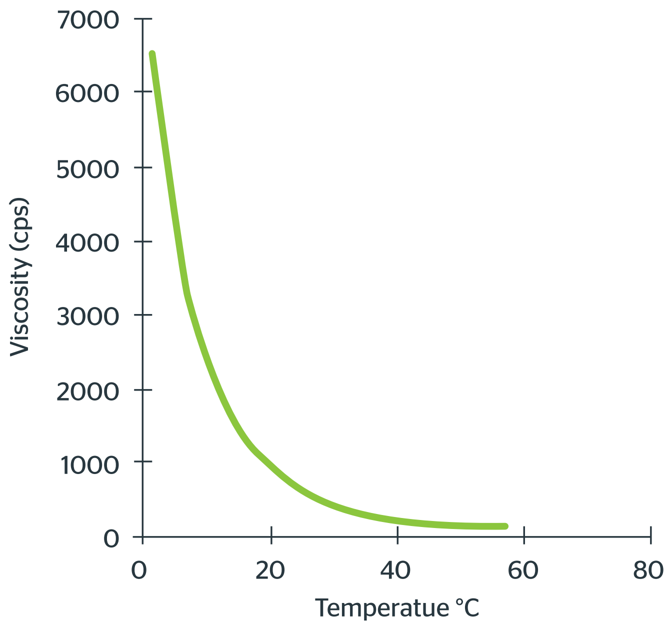
Handling

PC-1770 is a low-viscosity liquid at 25 to 40 C (see Typical Viscosity vs. Temperature Curve below) and blends easily with liquid asphalt. In the laboratory, simple stirring by hand or with a mechanical stirrer will thoroughly disperse PC-1770. In a plant or terminal setting, PC-1770 is metered precisely within specified dosage limits using conventional equipment having interlock and totalizer controls. Please contact your local Ingevity representative to obtain information on the handling and use of PC-1770 additive

Storage

PC-1770 is typically stored at ambient temperatures 20 to 25 C (68 to 77 F). Mild heating may be used to facilitate pumping, but PC-1770 should not be stored at temperatures of 50oC or heated to temperatures in excess of 60 C (140 F). Prolonged exposure to the open atmosphere should be avoided as it may alter product properties, activity, and performance.

Typical Viscosity



Safety: Always refer to the Safety Data Sheet for detailed information on shipping, handling, storage, and use.

Important: The information provided herein is believed to be accurate and reliable, but is presented without guarantee on the part of Ingevity. Further, nothing contained herein shall be taken as an inducement to violate any patent rights.

Compatibility with Materials of Construction

Product storage and handling equipment systems should be designed by qualified personnel. Selection of materials and design of system components should be made taking into account all pertinent safety, regulatory and engineering principles applying to heating systems, pump systems, transfer line sizes, pressures and temperatures, safety controls/interlocks, air emissions, spill containment, etc. For reference, the general corrosion rate of tap water (35 ppm hardness) on AISI 1010 carbon steel at 77 F is 3.4 mils/yr (no pitting or crevicing).

AISI 1010 (carbon steel)	0.04 mil/yr at 77 F (25 C), no pitting or crevicing, 0.25 mil/yr at 120 F (49 C), no pitting or crevicing
SAE 304L (stainless steel)	0.00 mil/yr at 77 F (25 C), no pitting or crevicing, 0.00 mil/yr at 120 F (49 C), no pitting and crevicing
SAE 316L (stainless steel)	Not tested, similar to or better than 304L SS
Aluminum	Chemically incompatible
Copper alloys (brass, bronze)	Chemically incompatible
Fiberglass	Chemically compatible
Polyethylene (LDPE, HDPE, PEX)	Chemically compatible
Polyvinyl chloride (PVC, CPVC)	Chemically compatible
Polymer seals	Contact the seal manufacturer for polymers compatible with organic amines of approximately 10-11 pH.

The entries above show the general corrosion rates of Evotherm products. Corrosion values were determined under static storage conditions. Material in motion in lines and pumps can create locally higher corrosion rates, or erosive effects. Since all metals will experience some degree of corrosion, you must choose construction materials based on your planned maintenance and structural integrity inspection program.

Ingevity
5255 Virginia Ave.
North Charleston, SC 29406
800 458 4034
evotherm@ingevity.com
ingevity.com

ATTACHMENT C - CERTIFICATE OF THE REGISTRATION OF A COMPANY

Certificate of the Registration of a Company

Corporations Act 2001 Paragraph 1274 (2) (b)

This is to certify that

PIONEER ASPHALTS PTY LTD

Australian Company Number 000 538 689

is taken to be registered as a company under the Corporations Act 2001 in New South Wales.

On the first day of April 1993 the company changed its name to
PIONEER ROAD SERVICES PTY LTD

On the third day of May 2010 the company changed its name to
FULTON HOGAN INDUSTRIES PTY LTD

The company is **limited by shares**.

The company is a **proprietary** company.

The day of commencement of registration is **the twenty-first day of June 1966**.

Issued by the
Australian Securities and Investments Commission
on this twenty-first day of March 2019.

James Shipton

James Shipton
Chair

CERTIFICATE