



Technical Specification

DT-CRMB-1912

DenimoTECH Crumb Rubber Modified Bitumen Plant

Capacities: 12 – 20 – 40 ton/hour



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Introduction

About DenimoTECH A/S

DenimoTECH is a global manufacturer of high quality equipment for modification and emulsification of bitumen, with a network of distributors worldwide focusing on helping our customers to be successful.

DenimoTECH is owned by DenimoTECH Holdings in the UK which is a private company focused on generating value for the petroleum, refining and power industries by leveraging their emulsion and industry expertise.

For over a decade DenimoTECH's mission has been to provide both the global road construction industry and oil companies with bitumen emulsion- and bitumen modification technology, innovation and expertise to produce highly stable products for building high performance roads that last, while minimizing the impact on the environment.



DenimoTECH is a worldwide supplier of PMB and Emulsion Technology

Scope

The scope of this specification is to give a detailed technical description of DenimoTECH CRMB plants. When partnering up with DenimoTECH innumerable possibilities are offered. We are always tailoring the plants according to our customers' needs. This specification covers the most common details and options. For further details or inquiries, please contact DenimoTECH directly.



DenimoTECH is a strong partner. We make sure that our customers get exactly what they need.

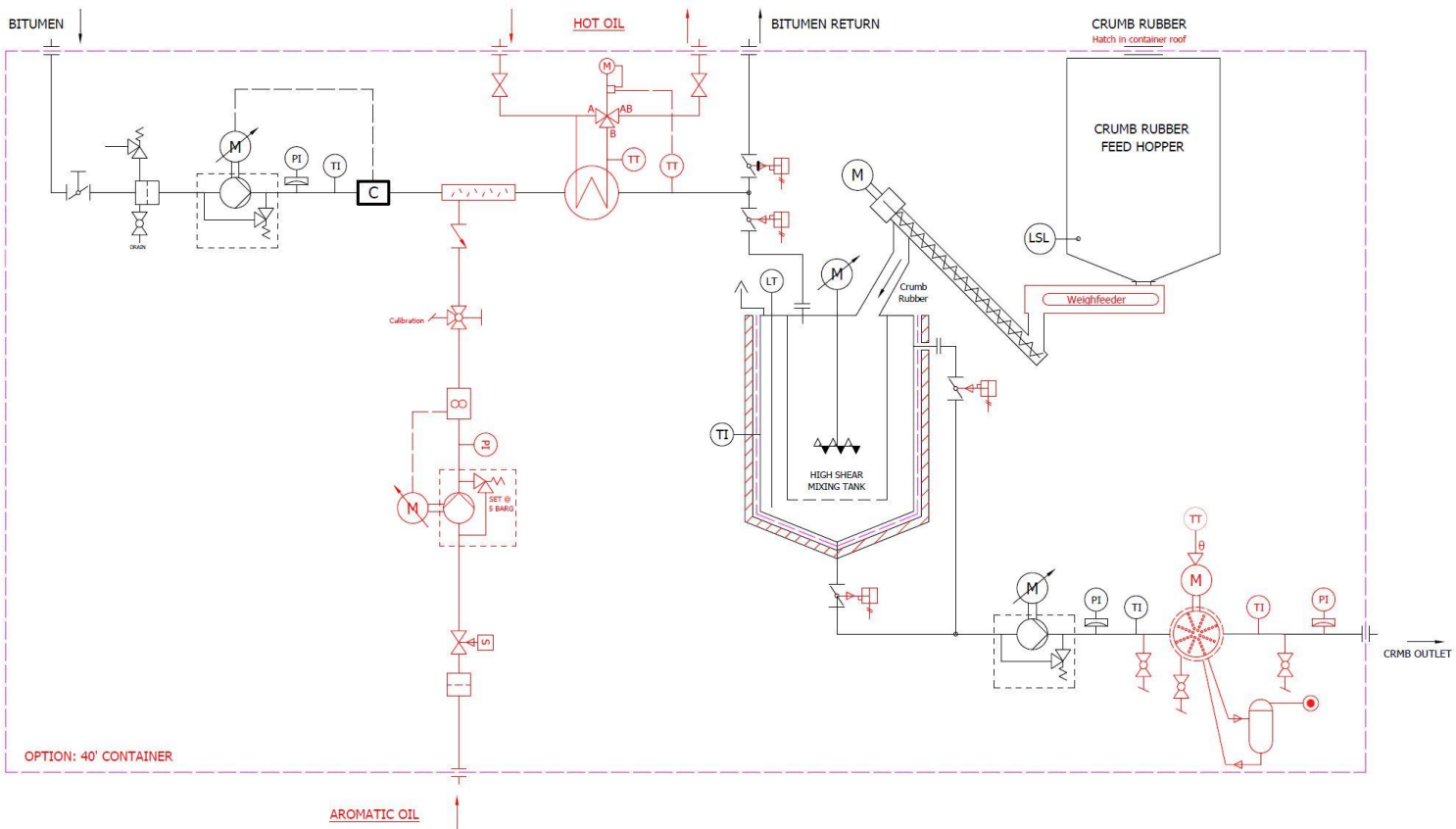
Technical Description

Process Description

The crumb rubber is loaded into a hopper and, from here metered into a dual chamber mixing tank using a weigh feeder and screw conveyor. Bitumen is pumped to the tank and a heavy duty high shear mixer serves to properly distribute the crumb rubber in the bitumen, before dispatch to the reaction tank.

Accurate material ratio is ensured by the weigh feeder for the crumb rubber and the Coriolis mass flow meter for the bitumen.

All process operations are controlled from a PLC with a graphic Human Machine Interface (HMI).



P&ID - Diagram contains options

Bitumen Feed Line

Bitumen pump is a positive displacement pump, controlled by a frequency inverter. The pump has a build-in pressure relief valve.

The flow meter is a Coriolis mass flow meter for measuring the bitumen flow rate direct in mass (kg/h). The bitumen density is highly temperature dependant. Also different supplies of bitumen may show different physical characteristics. The Coriolis mass flow meter ensures an accuracy of +/- 0.3% of reading independent of temperature and bitumen characteristics.

The flow meter has no moving parts, resulting in maximum service life.

Pump and pipes are electrically heated and insulated with mineral wool.

CRMB Mixing Tank

Vertical fully welded tank in Carbon Steel.

The tank has a dual chamber system that ensures efficient wetting and processing of all the added crumb rubber.

The tank is electrically heated for maintenance of temperature and protection against cold tank at start-up. Tank is insulated with mineral wool. NB! The electrical heating is not for elevating the bitumen temperature.

Specially designed industrial grade high sheer mixer for dispersion and processing of crumb rubber in bitumen.

Accurate and reliable guided microwave level transmitter for continuous level measurement.

CRMB is taken from the top of the tank under production and from the bottom at shutdown/emptying of tank. This is done by automatic valves placed at the outlets.

A duct fan ensures the maintenance of a slight vacuum in the tank, so that the vapors from the process are removed.

High-level shut-down

Overflow safety pipe



CRMB Transfer Pump

CRMB pump is a positive displacement pump made in hardened steel - specially designed for handling CRMB. The pump is controlled by a frequency inverter. Thermal oil heated and two internal relief valves for pressure relieving also when reversing the flow to empty the pipeline.

Pump is insulated with mineral wool.

Crumb Rubber Dosage System

Standard:

The plant is equipped with a 2m³ crumb rubber hopper/tank.

A screw conveyor, run by a frequency inverter, is feeding the rubber to pre mixing tank.

The system is designed to add crumb rubber in mass content from 10 to 25 % of the nominal plant output. This mixing ratio can be maintained throughout the capacity range of the plant, at a crumb rubber bulk density of minimum 350 kg/m³.

Option:

A highly accurate servo-controlled weigh feeder for measuring the mass flow rate of the crumb rubber directly.

Control System

DenimoTECH CRMB plants are controlled by a Siemens Industrial PLC with graphic Human Machine Interface (HMI). All signals from the process are fed directly into the PLC and processed here.

The fully integrated PLC with touch screen eliminates the need for a dedicated control room. If needed, slave monitors can be installed anywhere where operators are likely to be present.

The PLC can be remotely accessed through a GSM modem. Since the PLC is entirely controlling the process, a very extensive remote support can be offered. Software upgrades can also be carried out remotely.

Recipes are handled directly on the PLC through the touch screen. Extensive data logging can be carried out on a USB stick and exported to other applications for further analysis.

All software is developed by DenimoTECH.

Options

Mill System

DenimoTECH Mill has a fixed speed motor with 3000 RPM. The mill is directly coupled to the motor shaft by a flexible shaft coupling.

The mill is equipped with a high temperature front bearing

Moving parts of the mill are made from hardened steel to ensure optimal resistance to wear from abrasive elements.

The gap adjustment between rotor and stator is done manually, from the outside with a tool

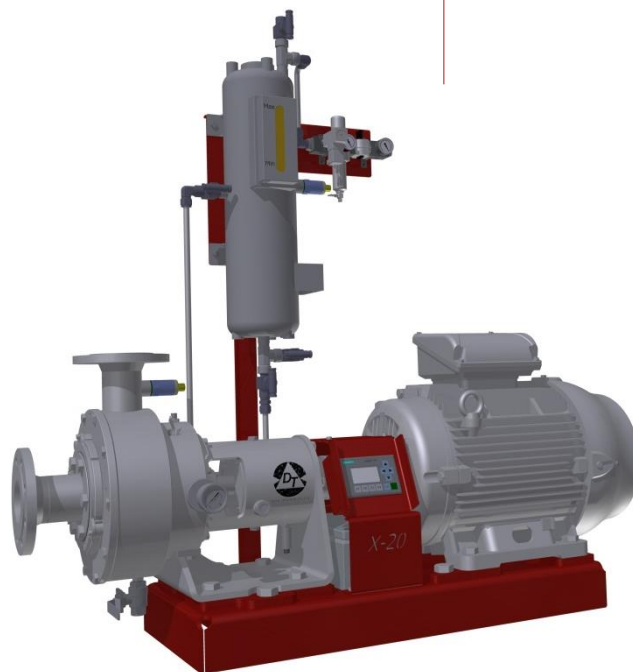
Meaning that no need for disassembly is needed

The mill head is electrically heated.

A wide range of mechanical shaft seals is offered to meet the strictest requirements

The mill has a build-in run-dry protection

Temperature ratings up to 250°C



DenimoTECH PMB Mill with double mechanical seal

Bitumen In-line Heater

The plant can be equipped with a shell and tube heat exchanger for inline heating of the incoming bitumen. Temperature can be elevated 40°C (eg. from 140°C to 180°C). The shell and tube heat exchanger can be disassembled and cleaned if needed.

The bitumen in-line heater is heated with thermal oil. A temperature control valve is used for controlling the output temperature of the bitumen.

Automatic Valve Control

For easy and fail safe start-up and shut-down, actuators with limit switches is offered for the valves that control bitumen flow in production or in circulation.

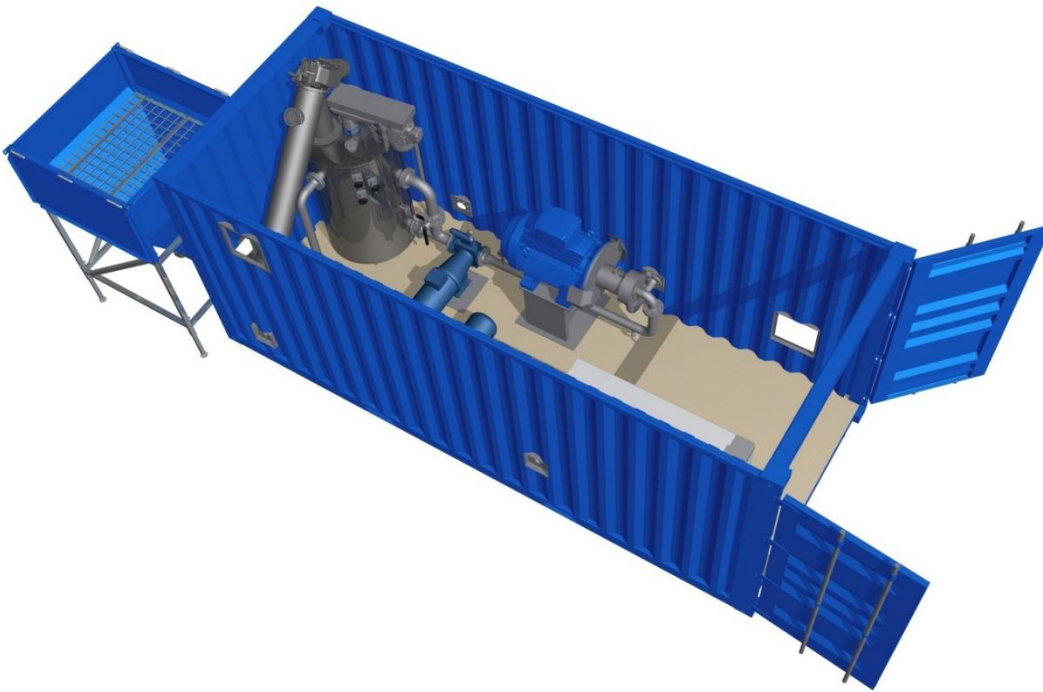
- Pneumatic actuators

- All signals are controlled by the PLC.

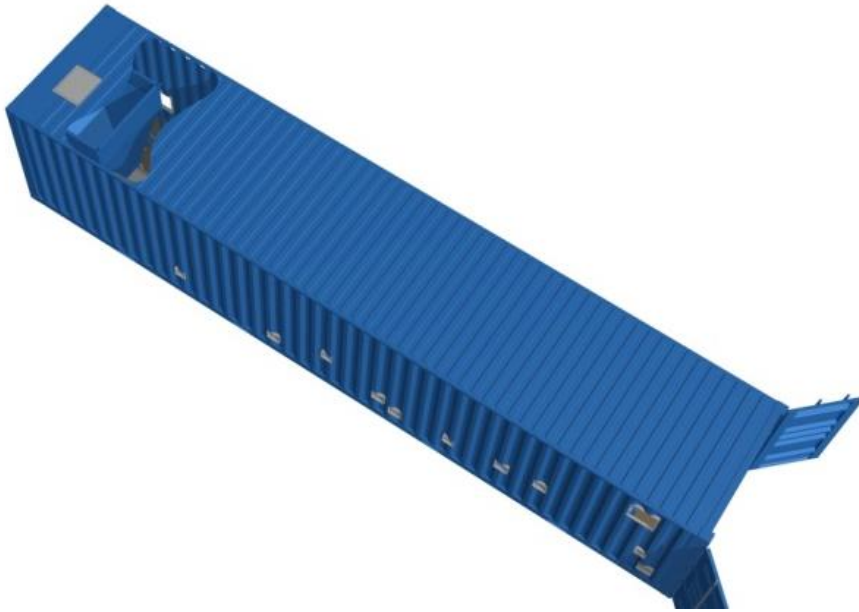
Container

The DenimoTECH CRMB Plant can be built into a standard shipping container (20' or 40' depending on the configuration).

This gives a very compact and highly mobile plant, and also in case of extreme weather like heavy rain, extreme cold or sand storm, the plant remains protected.



CRMB plant in 20 feet shipping container



CRMB plant in 40 feet
shipping container with
hopper placed inside
container

Technical Data

Process Line	Parameter	Unit	Plant Size		
	Nominal Capacity	T/h	12	20	40
Mill ¹⁾	Capacity	T/h	6-12	10-20	20-40
	Speed 50/60Hz	RPM	300/3600		
	Rated Pressure	Bar	10		
	Motor Power	KW	75	110	132
Bitumen Feed Line	Capacity	kg/h	6000-12000	10000-20000	20000-40000
	Flow meter accuracy of reading (mass)	%	0.3		
	Temperature, Maximum	°C	200		
	Viscosity	cSt	500		
	Pressure	Bar(g)	3		
	Motor power, Pump	kW	5.5	7.5	11
CRMB Mixing Tank	Volume	Liter	600	600	1200
	Level Transmitter accuracy	mm	3		
	Temperature, Maximum	°C	200		
	Mixer, motor power	kW	11	11	18,5
CRMB Transfer Pump	Capacity	kg/h	6000-12000	10000-20000	20000-40000
	Temperature, Maximum	°C	200		
	Pressure	Bar(g)	4		
	Motor Power	kW	5.5	7.5	11
Crumb Rubber Dosage	Capacity ³⁾	kg/h	1200-3000	2000-5000	4000-10000
	Accuracy ²⁾	%	2		
Bitumen In-line Heater ¹⁾	Temperature Elevation	°C	40	40	40
	Maximum Heat Transferred	kW	300	500	1000

1) Option

2) Weigh feeder data

3) Corresponding to an addition of 10-25 weight % at a crumb rubber bulk density of minimum 350 kg/m³

DenimoTech
the road ahead



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