VCM E-5

HIGH SHEAR INLINE HOMOGENIZER · COLLOID MILL

MACHINE PROPERTIES

Q — Capacity (max)	up to 5 t/h finished product, single pass — at reference condition (see note)	T — Product	≤ 210 °C bitumen phase (machine limit) · emulsion outlet below boiling under back pressure
Reference condition	bitumen emulsion 60–65 %, ≤ 100 cP at the mill	Feed temperature	bitumen 130–140 °C · water phase 40–60 °C
Duty	Bitumen emulsion, prime coat, cut-back — colloid milling	Viscosity	≤ 5,000 mPa·s (cP)
DN — Inlet / Outlet	DN65 / DN50 · flange EN 1092-1 PN16	Pmax — Operating pressure	5 bar · discharge head ≤ 10 m LC
Working gap	0.5 mm closed (milling) · 2 mm open (start-up)	Suction	≥ 0.3 bar positive, from a positive displacement feed pump
n — Rotor speed	2950 rpm (direct coupled)	Heating jacket	Thermal oil (T) · electric (E) · ≤ 240 °C

OPERATING PRINCIPLE AND CONSTRUCTION

VCM E-5 is an inline rotor-stator homogeniser (colloid mill). The bitumen phase and the water (soap) phase enter axially together and are drawn into the VIMPO MultiMix™ multi-stage proprietary rotor-stator tool, where it is taken in and pre-broken, then sheared and ground in a progressively narrowing wedge-shaped gap and homogenised — all in a single pass. The working gap is set to 0.5 mm for milling and opened to 2 mm for start-up, which keeps the starting torque and current low. The tool has a strong pumping action that supports the feed pump; a positive displacement pump upstream sets the throughput. Housing and stator support are jacketed so that bitumen never cools in the machine.

- VIMPO MultiMix™ multi-stage proprietary rotor-stator tool — draw-in, shearing/grinding, homogenising in one pass
- Rotor and stator Stainless steel 1.4404 / AISI 316L; housing ring Stainless steel 1.4408 (cast 316)
- Working gap OPEN / CLOSED by axial shaft movement — mechanical setting standard, hydraulic actuator with remote OPEN/CLOSED signal optional
- Separate bearing housing (GG25) with grease lubricated rolling bearings — bearings outside the hot product zone
- Shaft seal: gland packing, uncooled (GP) standard · single mechanical seal (MS) optional
- Heating jacket on housing and stator support, thermal oil or electric cartridges
- Machine, motor, ROTEX coupling and guard pre-assembled on a common steel baseplate

APPLICATIONS

- Cationic and anionic bitumen emulsions — rapid, medium and slow setting
- Polymer modified emulsions (latex, SBR) and micro-surfacing binders
- Prime coat, tack coat and cut-back bitumen (MC / RC)
- Colloid milling of pastes, greases, waxes and wet grinding of suspensions
- Food and cosmetic emulsions with stainless tool (special version)





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MODEL CODE

VCME5	DN50	T	GP	DD	15	2950
family + size	outlet size	heating	sealing	drive	motor kW	rotor rpm

Fields are separated by a hyphen and always appear in this order. A field is written only where the model offers a choice; an omitted field means the standard. A bare machine (without motor, baseplate and coupling) carries no drive, motor or speed field.

FIELD	VALUES FOR VCM E-5	MEANING
FAMILY + SIZE	VCME5	VCM E-5 — emulsion (E) tool, size 5 t/h homogenising capacity — fixed
OUTLET SIZE	DN50	Outlet DN50 — fixed. Inlet DN65.
HEATING	T · E	T — thermal oil jacket (standard) E — electric heating cartridges with thermostat, for plants without a thermal oil circuit
SEALING	GP · MS	GP — gland packing, Kevlar/graphite, uncooled (standard) MS — single mechanical seal, high temperature faces
DRIVE	DD	DD — direct coupled IEC motor, ROTEX coupling (standard) Written on motor coupled units only.
MOTOR kW	IEC notation	Installed motor rating for VCM E-5: 15. The decimal separator is written as K (5K5 = 5.5 kW). IE3, 400 V 50 Hz, IP55.
ROTOR rpm	2950	Rotor speed = motor speed on direct coupled units (2-pole 2950 · 4-pole 1450). With belt drive (BD) the speed after the pulley ratio.

EXAMPLE	READS AS
`VCME5-DN50-T-GP-DD-15-2950`	Complete unit on baseplate, thermal oil jacket, gland packing, direct coupled 15 kW motor, 2950 rpm — standard unit
`VCME5-DN50-E-GP-DD-15-2950`	As the standard unit with electric heating (code E)
`VCME5-DN50-T-MS-DD-15-2950`	As the standard unit with mechanical seal (code MS)
`VCME5-DN50-T-GP`	Bare machine with thermal oil jacket — no drive, motor or speed field

DIMENSIONS

General arrangement drawing — machine on baseplate with motor

Baseplate, motor and overall dimensions depend on the selected drive and are issued with the order acknowledgement together with the general assembly drawing.

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CAPACITY AND DRIVE

The rated capacity of VCM E-5 is 5 t/h of finished product in a single pass at the reference condition. The achievable rate depends on the emulsion type, the bitumen content and the bitumen grade, and with a second pass or recirculation the machine handles the same product at a lower net production rate. Neither the pass number nor the exact derating can be stated generally — the duty is confirmed by Vimpo engineering against the product data of the enquiry, and by test where required.

MOTOR	ROTOR rpm	
15 kW	2950	standard unit

Motors IE3, 400 V 50 Hz, IP55, direct coupled through a ROTEX coupling. Star-delta or soft starter above 30 kW. The feed rate is set by the positive displacement feed pump; the mill's own pumping effect covers line losses up to 10 m LC at 5 bar maximum operating pressure.

OPERATING CONDITIONS

Feed	Bitumen phase and water (soap) phase dosed in ratio into the mill inlet by two positive displacement pumps (VD / VN series), suction pressure ≥ 0.3 bar. Bitumen 130–140 °C, water phase 40–60 °C.
Solids	Bitumen droplets from the pre-mixer; no solid particles. Water phase filtered, emulsifier fully dissolved.
Temperature	Bitumen phase ≤ 210 °C (machine limit) · heating jacket ≤ 240 °C. A back pressure of 2–3 bar at the mill outlet keeps the emulsion below boiling. The jacket must be at working temperature before start; never start with cold bitumen in the tool.
Start-up	Gap OPEN (2 mm), feed pump running, then close the gap to 0.5 mm under flow. Starting current stays close to nominal; star-delta or soft starter for motors above 30 kW.
Dry running	Not permitted — the packing and the tool are damaged. Interlock the mill motor with the feed pump and a flow or pressure switch.
Shutdown	Open the gap, flush with hot bitumen or flux oil, keep the jacket heated until the machine is empty. Long standstill: drain through the outlet plug.
Pressure	Operating pressure ≤ 5 bar. A pressure relief in the discharge line is required where the line can be closed.
Direction of rotation	As marked on the bearing housing — uni-directional. Check before coupling the motor.

MATERIAL OPTIONS

Rotor · stator	Stainless steel 1.4404 / AISI 316L (standard) · hardened tool steel 1.2379 / 1.4112 for abrasive polymers
Housing ring	Stainless steel 1.4408 (cast 316) (standard)
Stator support · housing	Cast steel GP240GH / 1.0619 jacketed (standard) · stainless 1.4408
Shaft	42CrMo4 / AISI 4140 tempered steel with stainless sleeve in the seal area
Bearing housing	Cast iron GG25 · grease lubricated rolling bearings, L10h ≥ 25,000 h · oil bath optional
Static seals	FKM (Viton A) O-rings −20 / +200 °C (standard) · FFKM for solvents · graphite gaskets on the jacket
Baseplate · guard	Steel S235 (St 37), painted RAL 5005

SEALING — CODE FIELD GP / MS

GP — Gland packing	Standard. Kevlar/graphite braided packing, uncooled, adjustable gland with stainless shaft sleeve. Slight controlled leakage is normal and lubricates the packing.
MS — Mechanical seal	Option. Single, high temperature seal (SiC / carbon, FFKM or graphite) with quench connection (API 682 Plan 62) for zero-leakage plants.

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HEATING — CODE FIELD T / E

T — Thermal oil jacket	Standard. Jacketed housing and stator support, heating medium connections DN25 PN16 · ≤ 240 °C / 10 bar.
E — Electric heating	Option. Heating cartridges in the housing and stator support with PT100 and thermostat, 400 V; heating power stated with the order. For plants without a thermal oil circuit.
Insulation	Removable insulation jackets for housing and piping — option.

SCOPE OF SUPPLY AND OPTIONS

Standard unit	Homogeniser with thermal oil jacket · IEC motor 15 kW IE3 IP55 · ROTEX coupling and guard · steel baseplate · mechanical gap setting OPEN/CLOSED · factory test run
Bare machine	Homogeniser only — without motor, coupling and baseplate, for integration into an existing plant. Code without drive, kW and rpm fields.
Options	hydraulic gap actuator OPEN/CLOSED with control box (LOCAL/REMOTE, 24 V I/O) · stepless gap control · electric heating (E) · mechanical seal (MS) · larger motor · ATEX motor · soft starter or VFD control panel with ammeter and interlocks · feed pump (VD / VN) on common skid · suction strainer · insulation · stainless tool for food / cosmetics
Paint	Epoxy primer 60 µm + silicone based heat resistant top coat for hot surfaces · baseplate polyurethane · RAL 5005 (Vimpo blue), other RAL with the order.
ATEX	Available in ATEX version — II ½G Ex h IIB T4 Ga/Gb, zones 0 and 1 (2014/34/EU · EN ISO 80079-36/-37); EU-type examination certificate IEP 24 ATEX 1315X Suppl. 01, notified body 2284. Liquid temperature max. 130 °C. The motor is of Ex d or Ex e type to EN 60079-0/-1/-7. Any temperature or pressure sensor fitted must itself be Ex protected (zone 1, IIB, min. T4). Installation and periodic maintenance by authorised personnel to the operating instructions; replacement of a part requires re-approval. Zone, gas group and temperature class stated with the order.
Documents	CE declaration of conformity (2006/42/EC) · operating and maintenance manual · general assembly drawing with parts list · sectional drawing · material certificates EN 10204 2.1 (3.1 optional) · workshop test protocol · electrical diagrams (with control option)

APPLICABLE STANDARDS

2006/42/EC	Machinery Directive — CE declaration of conformity
EN ISO 12100	Safety of machinery — risk assessment
EN 809	Pumps and pump units for liquids — safety requirements (pumping action of the machine)
2014/34/EU	ATEX — equipment for explosive atmospheres (optional version)
EN 1092-1	Steel flanges — dimensions and pressure rating
EN 10204	Material inspection certificates 2.1 / 3.1
EN 13808	Framework for specifying cationic bitumen emulsions (product quality reference)
IEC 60034 · IEC 60072	Motor efficiency class IE3 and IEC frame dimensions

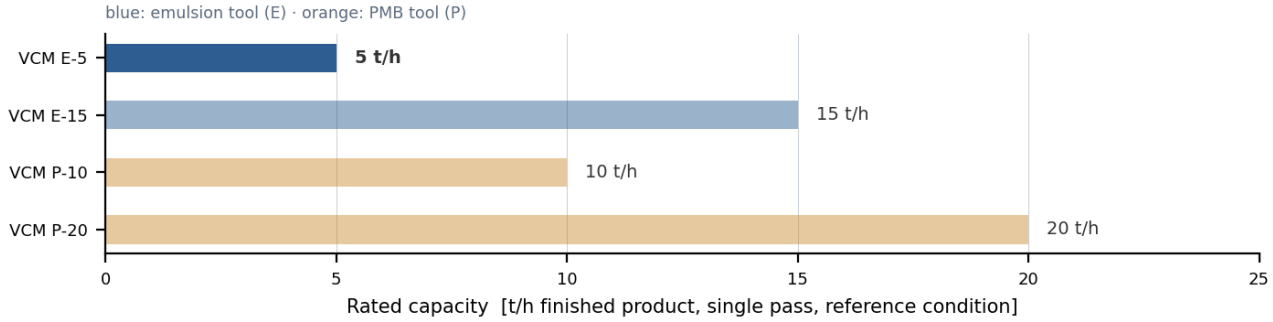
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APPLICATION GUIDE — RECOMMENDED CONFIGURATION BY PRODUCT

PRODUCT	MODEL	TOOL	HEATING · TEMP.	SEAL	NOTES
Bitumen emulsion cationic / anionic, 60–70 %	VCM E-5 · E-15	Stainless tool (standard E)	T or E · 130–140 °C bitumen, 40–60 °C water phase	GP	Bitumen and soap dosed by two PD pumps into the mill inlet; back pressure 2–3 bar keeps the emulsion below boiling.
Polymer modified emulsion latex SBR / natural	VCM E-5 · E-15	Stainless tool	T or E	GP	Latex into the water phase or directly at the mill inlet; rate 20 % below emulsion rate.
SBS PMB 3–5 % road binder	VCM P-10 · P-20	Hardened 42CrMo4 tool (standard P)	T · premix 185–190 °C	GP · MS	Single pass, gap 0.5 mm; 1–2 h maturation with agitation after milling.
SBS 5–7 % · HiMA 7–10 %	VCM P-10 · P-20	Hardened tool; larger motor	T · 190 °C	GP · MS	Recirculation over the tank, 2–3 turnovers; hydraulic gap control recommended.
APP / IPP / EVA roofing membrane compound	VCM P-10 · P-20	Hardened tool 1.4112 or carbide coated	T · 180–200 °C	MS	Hard polymers: larger motor, reduced rate, gap 0.5–1.0 mm; filler added after milling.
Crumb rubber 10–20 % CRMB wet process	VCM P-20	Carbide coated teeth	T · 180–190 °C	GP	Rubber ≤ 1 mm; gap 1.0 mm; 45–60 min digestion at temperature with agitation.
Prime coat · cut-back · flux	VCM E-5 · E-15	Standard	T or E · 80–120 °C	GP	Mixing duty, gap open; ATEX version with solvent based cut-backs.
Pastes, greases, wet grinding chemical · food · cosmetic	VCM E-5 · E-15	Stainless 1.4404 tool and housing; FDA elastomers	As the product requires	MS	Special version — compatibility and cleaning (CIP) reviewed per enquiry.

Typical starting points. The final configuration is confirmed by Vimpo engineering against the product data given in the enquiry: polymer type, grade and content, base bitumen, required production rate and plant heating medium.

VCM SERIES — CAPACITY OVERVIEW



MODEL	TOOL	IN / OUT	CAPACITY t/h	MOTORS
VCM E-5	Emulsion	DN65 / DN50	5	15 kW
VCM E-15	Emulsion	DN65 / DN65	15	37 kW · 45 kW
VCM P-10	PMB	DN65 / DN65	10	75 kW · 110 kW
VCM P-20	PMB	DN100 / DN100	20	132 kW · 160 kW @1450

Rated capacities at the reference condition; the achievable rate depends on polymer content and hardness (PMB) or on emulsion type and bitumen content (emulsion) and is confirmed per enquiry. VCM E-15 was formerly named VCM E-10. Technical data subject to change without notice.

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