



**II CONGRESO
PALMERO
MEXICANO**
POR UN SECTOR PALMERO COMPETITIVO,
PRODUCTIVO Y SUSTENTABLE

**VIII CONFERENCIA
LATINOAMERICANA
RSPO**

M É X I C O 2 0 2 0

MAGISTRAL CONFERENCE

OIL PALM FRUITS & PROCESSING TECHNOLOGIES

Speaker : Mr. Pravin Nehete
Sr. Vice President (Technical)
Kumar Metal Industries Pvt. Ltd.

FEMEXPALMA
Federación Mexicana de Palma de Aceite

RSPO | Roundtable on
Sustainable Palm Oil



Corporate Overview

- ❑ Established in the year 1939
- ❑ Corporate Head Quarters located in Mumbai
- ❑ Complete solution provider to the oilseed crushing, solvent extraction oil refining, and Biodiesel industry
- ❑ Our presence across 60 countries and serve over 500 customers

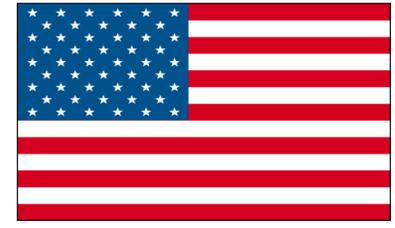
2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Our Mission

To provide premium service, equipment and process technology, which in turn produces a quality end product that helps to promote our customer's business.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Joint Venture Operations



KMIPL is in technical collaborations with Crown Iron works company USA : a world leader in oil extraction and refining plants.



Certification & Recognition

ISO 9001-2015 Certification

Our Quality Assurance System is certified in compliance with ISO 9001-2015 by Notifying Body TUV NORD



CE-PED & Machinery Certification

Kumar Metal Industries is approved to design and manufacture pressure vessels in compliance with the European Council's Pressure Equipment Directive 97/23/EC & Machinery Directive 98/37/EC, by the European Notifying Body



ATEX

Testing and certification of all equipment to be used in a potentially explosive atmosphere are approved under the ATEX Directive 94/09/EC, by the European Notifying Body



Approval for Australia and New Zealand codes

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Infrastructure



Kumar's manufacturing and fabrication units span across 22,762 sq. meters, house over 400 skilled technicians, quality control personnel, dedicated workmen and the latest precision European machinery. Our fabrication facilities are capable of manufacturing high pressure vessels & are equipped with certified x-ray qualified welders. For hard facing & critical wear & tear parts our highly trained TIG/MIG welders take over.

Crucial to every part of the process, our quality department checks the project at every stage ensuring our clients always get superior quality products. Our equipment has a reputation of being robust in construction, superior in quality, versatile in nature and operationally profitable. Also, our vastly experienced personnel provide training to customers; operating staff.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Infrastructure

Factory Details	Mira Road Unit No.1	Manor, Palghar Unit No.2
Land (Sq. Ft)	45,000	2,00,000
Covered Area (Sq. Ft)	40,000	77,000
Building (Sq. Ft)	6,000	2,270
Fabrication Bay (Sq. Ft)	30,000	56,000
Machine shop (Sq. Ft)	6,500	12,000
Crane capacity	20 ton*4 and 5 ton*2	30 ton*2 and 20 ton*5
Stores (Sq. Ft)	7,000	9,000

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Infrastructure



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

EST. - 1939



GEARED FOR PROGRESS



Kumar Strengths

□ Process Design

Detailed
Engineering

Equipment
Manufacturing

QA/QC Approval

Erection

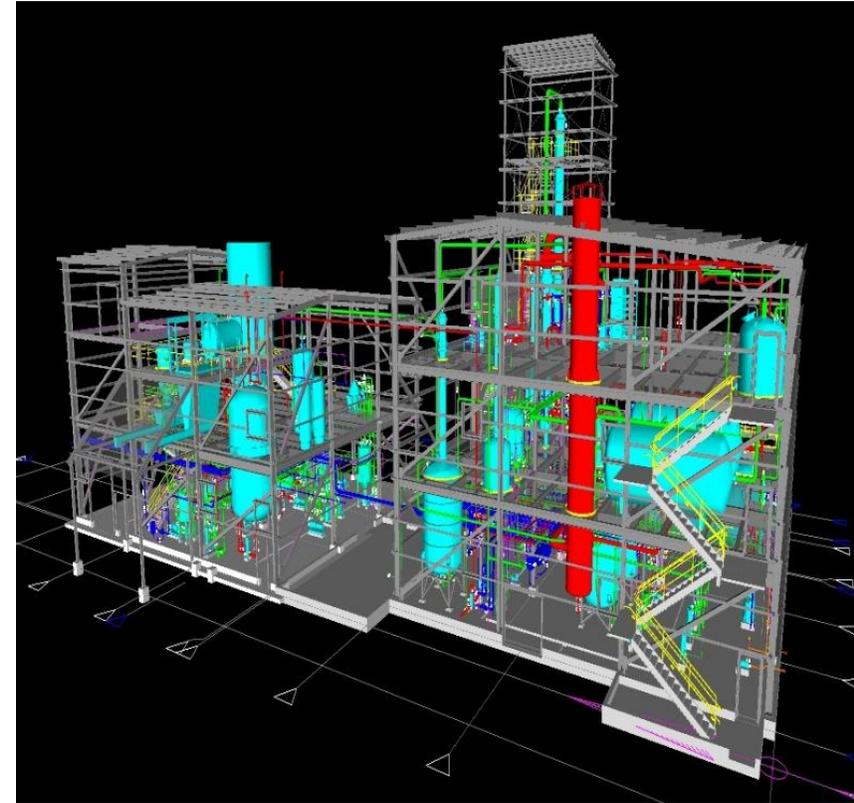
Trial Run &
Commissioning

Performance
Optimization

Operation &
Maintenance
Training

Kumar Strengths - Engineering Tools

- AutoCad latest version
- CADWorx P&ID
- CADWorx Pipe
- Navisworks
- ChemCAD
- HTRI
- Compress
- Solid Works
- FEA



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Services Offered

❑ Technology Identification:

Identify the appropriate technology and selection of equipment with modern technology in various processes.

❑ Project Execution:

Experienced engineers coordinate individual project from start to finish.

Well qualified mechanical/chemical engineers having vast experience for project execution.

❑ Engineering

Equipment and Foundation layout P&ID's, utility consumption Parameters, 3D Modeling, structure design, utilities and complete design integration of complex.

Have designed plants as per European, American, Australian, NZ standards, including FEA analysis, Stress analysis and Structural load designing.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Services Offered

Installation:

Well trained Installation team in all aspects such as shifting of equipment, foundation layouts, piping, instrumentation, cabling and Insulation. Kumar has installed plants all over the world.

Commissioning

Our commissioning team provides dry run and product trials with full performance before handover achieving all utilities and consumption as per our agreement.

After Sales:

Our services include trouble shooting, monitor performance, advice on possible expansion plans and improvements.

Kumar believes in 24x7 after sales services.

Turnkey Solutions

- Installation of the plant including tools and tackles, workshop equipments.
- Pre fab structure for plant buildings.
- Cooling tower, pump with water distribution system.
- Steam boiler with steam distribution network and water treatment plant.
- Air compressor and distribution network.
- Storage tanks design & supply with instrumentation & automation.
- Laboratory equipments & instruments.
- Grain unloading, precleaning & storage Silos.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Refining Process of Crude Palm Oil / Palm Kernel Oil

Key Process:

Pre-treatment & Bleaching

De-acidification / Deodorizing

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Refining Process of Crude Palm Oil / Palm Kernel Oil

Additional Process:

Dry Fractionation

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Crude Palm Oil Typical Quality Parameters

- F.F.A. : 5.0 Max
- PV : < 5.0 Meq/kg
- Phosphorous (P) : 20.0 ppm max
- Moisture : < 0.15 %
- DOBI : 2.3

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

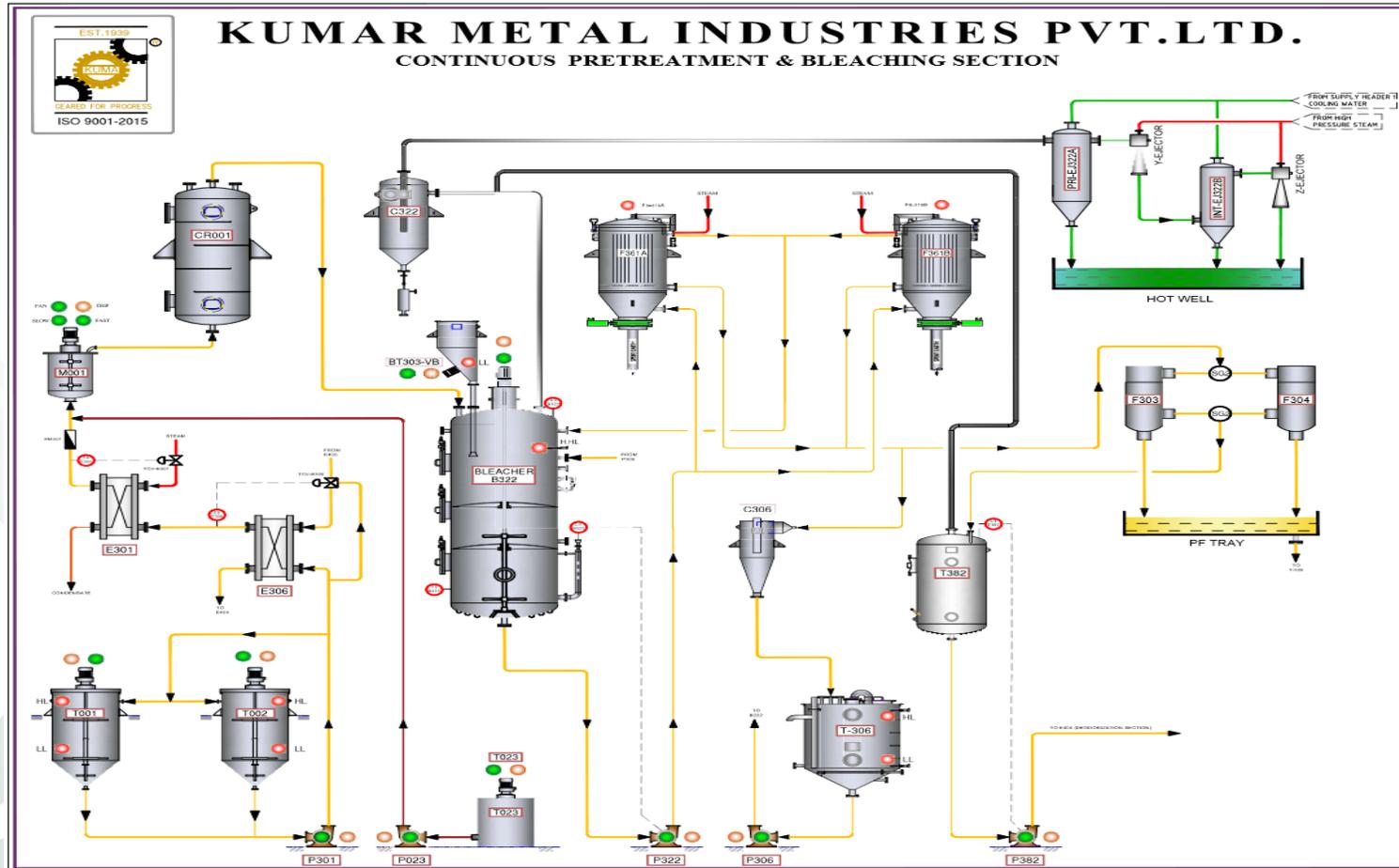
Kumar Pre-treatment & Bleaching Section

PURPOSE:

To remove the contaminants from crude oil prior to Deodorization

- Insoluble solids (Meal)
- Phospholipids (Gums)
- Oxidative materials (Metal Ions)
- Metals & pr-oxidants (Cu, Ca, Fe, Mg and P)
- Color bodies (Chlorophyll & Carotenes)

Kumar Pre-treatment & Bleaching Section



2019-2020 © FEMEXPALMA | RSPQ. Todos los derechos reservados.

Operating Conditions

Operating conditions depend on bleaching clay

Condition	Range	Typical
Temperature	Up to 125°C/260°F	85-110°C 185-230°F
Time	30-40 min	30-40 min
Vacuum	50-70 mmHg	50-70 mmHg
Moisture	0.1-0.5%	0.2-0.3%

Kumar Pre-treatment & Bleaching

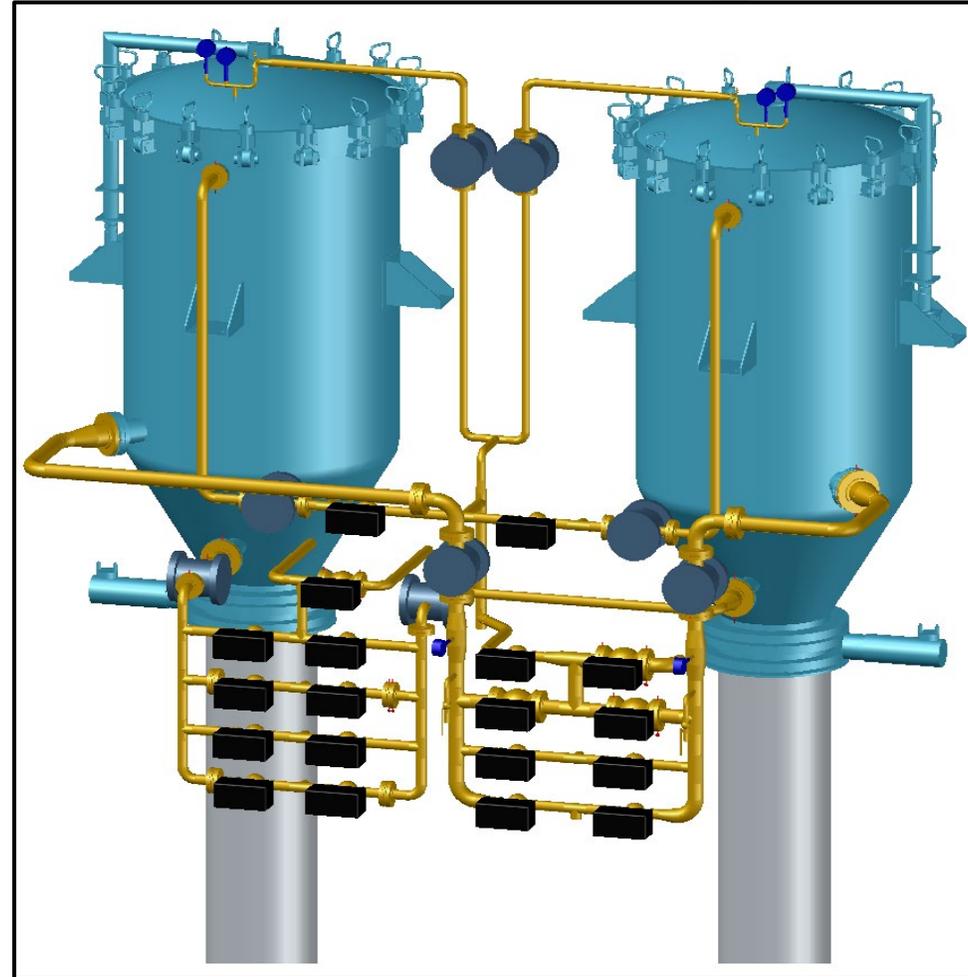
Salient Features

- Compact Design - A Single vessel for bleaching earth slurry preparation & Bleaching
- Better contact between oil & bleaching earth since bleacher is equipped with mechanical agitation & sparging steam
- Maximum Oil recovery by steam blowing results in lower retention of oil in spent earth
- Low consumption of bleaching earth
- Lower consumption of utilities
- Ensure accurate dosage of bleaching earth controlled by PLC
- No carryover of bleaching earth to the vacuum system
- Efficient Automated filter operation



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Pressure Leaf Filters



2019-2020 ©

EST. - 1939



GEARED FOR PROGRESS



Bleached Oil Typical Quality Parameters

- PV : < 0.5 Meq/kg
- Phosphorous (P) : < 5ppm but < 2ppm (typical)
- Iron (Fe) : < 0.2 ppm
- Moisture : < 0.05 %

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar De-acidification / Deodorizing

PURPOSE

Improve odor, flavor, colour and stability of oils and fats by removing or inactivating:

Material causing unpleasant odors or flavors (FFA, aldehydes & ketones)

Unsaponifiables (tocopherol and sterols)

Oxidative materials (peroxides)

Colour bodies (carotenoids)

Toxic substances (pesticides & herbicides)

Types of Deodorizers

- Continuous Deodorization
 - Tray Type
 - Packed Column (PC)

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Typical Deodorizing Feedstock Specifications

Free Fatty Acid (FFA): 0.07% - 5%

- 0.07% to 0.1% for neutralized oils and fats

- 3% to 5% for palm oil and edible fats

Phosphatides: 2-10 ppm P

Moisture: \leq 0.1%

Iron (Fe): \leq 0.2 ppm

Unsaponifiabiles: 1.0%

Soap: zero

Impurities: zero

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Continuous Deodorizing System

Benefits:

Designed for:
Deacidification (physical refining)
Deodorizing

Low Trans
Preserve oil quality
Maximum protection from air

Low steam consumption
Low energy consumption



FLEXIBILITY

+



QUALITY

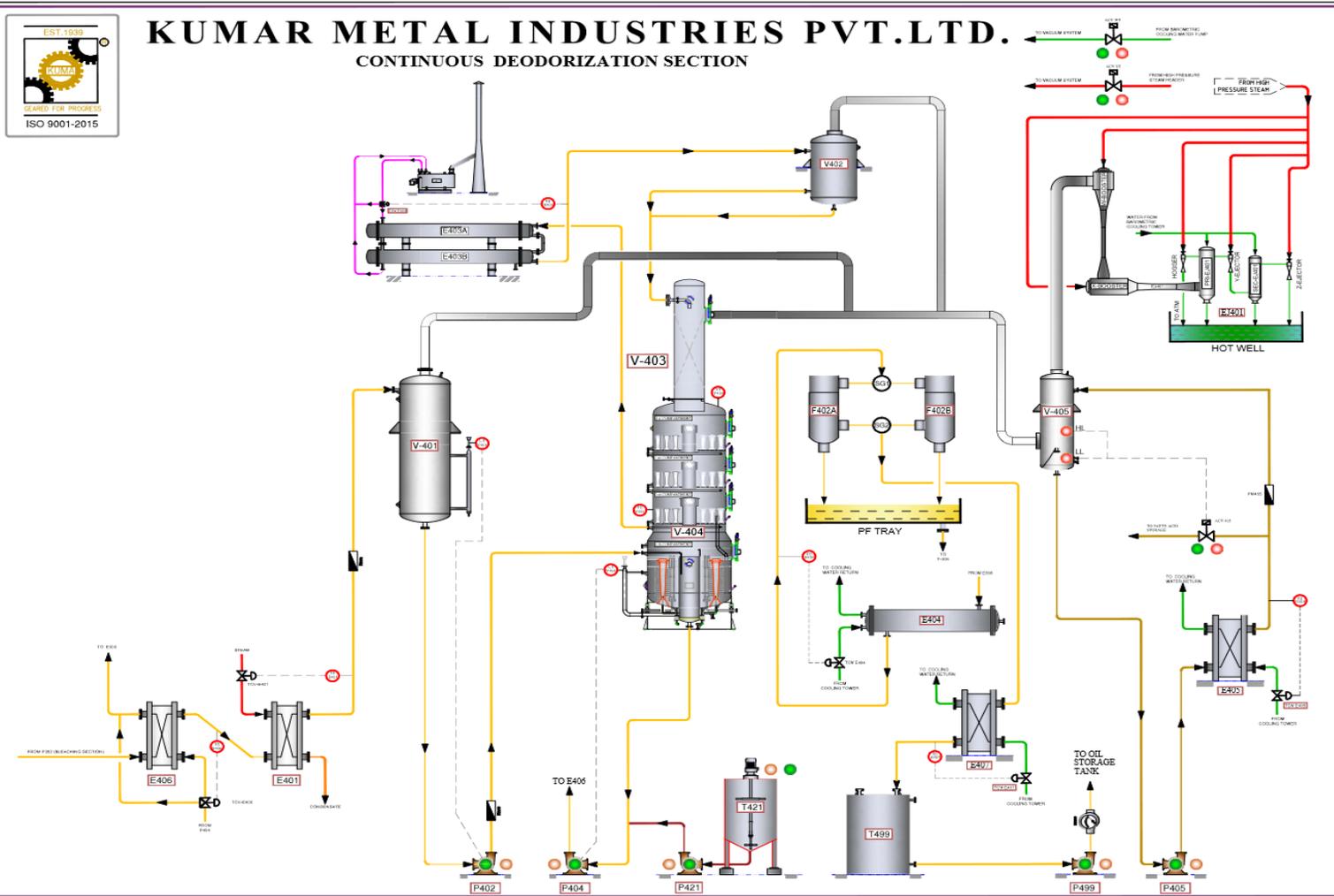
+



YIELD

ECONOMY

Kumar De-acidification / Deodorizing



2019-2020 © FEMEXPALMA | RSPO.



Kumar Deodorizer

- No stagnant zone.
- Ensures large surface area provided by structured packing to stripped of the FFA (free fatty acid)
- Ensures an extremely high steam to oil interfacial surface.
- Highly efficient mammoth pump for sparging the steam to ensure the intensive agitation.
- Low pressure drops.
- Robust construction.
- Easy maintenance.
- Low stripping steam required.
- Optimized retention time reduces low trans fatty acid formations.
- Minimum carry over of the fatty acid by specially designed fatty acid scrubber equipped with structured packing & demister pad.
- Heating & cooling under vacuum
Specially designed automation system for risk free & easy operation to avoid human error.



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar De-acidification / Deodorizing Plant

Salient Features

Well designed structured packing in the Deaerator,

Low steam requirements - Optimised live steam injection and full vacuum to ensure excellent deaeration of oil.

Minimised polymerization in heat exchangers.

High heat recovery in Deodorizer having efficient Inbuilt Economizer - Maximum heat is recovered from deodorized oil to ensure proper oil temperature for storage for optimum shelf life.

Efficient deodorizing of oil, Low cross-contamination - Kumar system is designed for optimum deodorization temperature and high retention time to ensure enhanced shelf life of refined oil having negligible Trans Fatty Acids.

Low oil carryover with fatty acid resulting in lower deodorizing process loss.

Efficient designed vacuum system for low motive steam consumption.

Well designed liquid distributor in vapor scrubber to ensure optimum condensation of free fatty acid vapors.

Typical Deodorizing Output Oil Specifications

Refined Palm oil specification

Particulars	Refined Palm Oil
FFA content	0.05 % max.
Moisture	0.05 % max.
Impurities	Nil
Peroxide Value	Commercially nil
Iodine Value	52 -53
Melting Point	39 - 40deg C
Colour	3 R (5 ¼" cell)
Anisidine value (AV) meq/kg	3
Odour	Bland
Taste	Neutral

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Deodorizer

Automation System for Physical Refinery

Kumar metal provides dedicated PLC based plant control automation system. Allow the plant operator to monitor all the process activity like plant start up, shut down & process parameters from one centralized location.

Easy system helps the operator to understand how to proceed with the operation sequence by easy graphical presentation.

Risk free operation with minimum human mistakes.

Data locking of all the process parameters.

History data base to analyze for all process parameters and generated the report which is undeniable witness of complete activity of process.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Fractionation for Palm Oil



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Dry Fractionation Technology

A process to separate vegetable oils such as palm oil into two fractions, Olein and Stearin, by the crystallization properties of the oils..

Crystallization Section

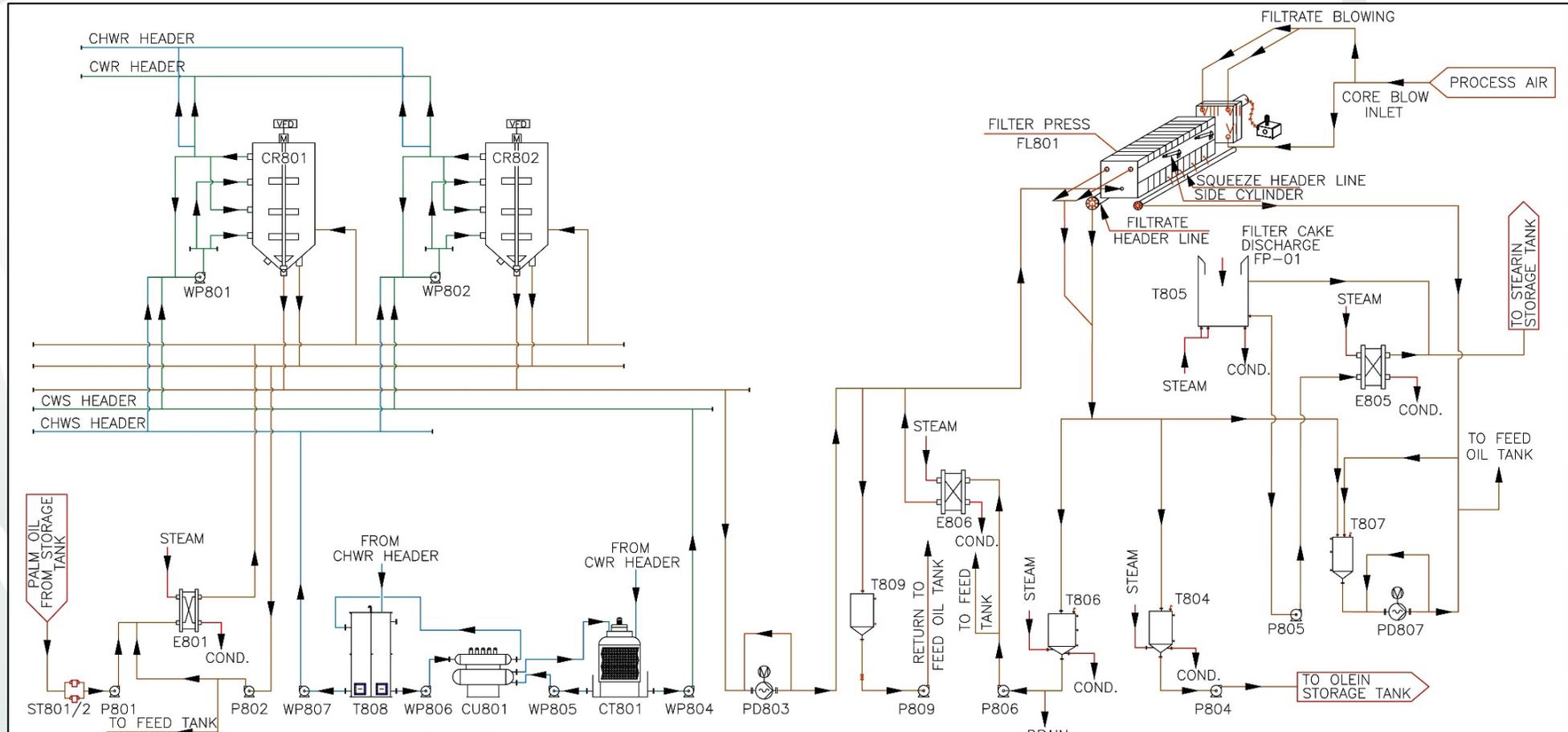
Preheating RBD palm oil

Cooling in a controlled environment to form crystals using PLC or programmable controllers.

Filtration Section

An automated membrane filter press to separate the stearin crystals from the liquid olein. Olein yield is maximized by squeezing the stearin cake through inflation of the membrane with air or liquid.

Kumar Dry Fractionation with Membrane Filter



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Dry Fractionation Technology

Salient Features

Crystallizers is heart of dry fractionation process.

A result of years of studies and continual enhancements, the Kumar crystallizers are developed of good and robust design.

Multiple sets of double-layered cooling coils surrounding a uniquely designed multi-impeller agitator to ensure proper crystal formation

Designed to provide optimal heat transfer efficiency and thermal homogeneity within the oil while maintaining minimal disturbance to crystal growth.

Can be tailored to produce different highly filterable crystals to suit various customer-specific fractionation requirements.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Dry Fractionation Technology

Salient Features

Appropriate recipe for crystallization results in excellent olein recovery.

Precise temperature control.

Suitable selection of Membrane filter size, (Squeezing pressure, number of membranes, Cake thickness, etc).

Appropriate chilling unit selection leads to less power consumption.

Excellent Palm Olein quality.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Dry Fractionation Technology

Salient Features

Flexibility

The same crystallizer can be used for both the first or second fractionation processes to produce normal olein or super olein with lower cloud point; or further fractionation of stearin to produce tailored products.

Efficiency

Double layer coils are grouped in multiple sections to achieve optimum cooling efficiency. Furthermore, the agitation is varied by a frequency inverter during crystallization to homogenize the slurry with minimum disturbance to the process.

Minimum Operating Cost

Utilities costs are reduced using cooling water for pre-cooling during crystallization, thereby reducing the load on the water chiller. In addition, there is no chemical dosage, no oil loss and no pollution as in wet fractionation processes. Absorption chillers may be adopted when feasible to further reduce operating cost.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Dry Fractionation Technology



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

EST. - 1939



GEARED FOR PROGRESS



Kumar Dry Fractionation Technology

Separating high-melting fractions (stearin) from low-melting fractions (olein) by cooling in a controlled process is called fractionation. One of the key factors determining the success of the fractionation process is the efficiency of separation. Fractionation is designed to separate various fractions based on differences in crystallizing temperatures.



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

New Challenges in Palm oil Processing

The occurrence of esters in food oil

- 3-monochloropropane diol (3-MCPD)**
- 2-monochloropropane diol (2-MCPD)**
- Glycidyl esters GE**

New Challenges in Palm oil Processing

The growing attention on the nutritional quality of food oils is one of the main drivers for new developments in the edible oil refining industry. Over the years, the refining process has continuously been improved to assure the production of high quality food oils with no or very low levels of contaminants and minimum amounts of *trans* fatty acids (TFA).

In May 2016, the European Food Safety Authority (EFSA) published its long expected scientific opinion on the risks for human health related to the presence of 3-MCPD/2-MCPD esters and GE in food. The report concludes that 3-MCPD esters and GE have the same toxicological profile as free 3-MCPD and glycidol and are therefore a potential health concern. GE are considered more harmful since some in vivo studies indicate that glycidol is a genotoxic compound. Not enough toxicological data is available to conclude about the toxicity of 2-MCPD.

New Challenges in Palm oil Processing

Palm oil is the most widely used vegetable oil in the world. The global market is growing, the applications are diverse. At the same time, the oil is under intense debate. Fatty acid esters 3-MCPD (3-monochloropropane-1,2-diol) can be found in all types of cooking oils and foods containing fat but palm oil exhibits relatively high levels of these fatty contaminants. As the substances are suspected of being carcinogenic, certain maximum daily values should not be exceeded in consumption. For the palm oil producers, this means reducing the contents of these contaminants as far as possible.

Oil Type	3-MCPD	2-MCPD	GE
Soybean	0.4 ppm	0.2 ppm	0.2 ppm
Rapeseed	0.2 ppm	0.1 ppm	0.2 ppm
Sunflower	0.5 ppm	0.25 ppm	0.25 ppm
Palm	3 ppm	1.5 ppm	4 ppm

Economical Mitigation Technologies

Mitigation of 3-MCPD

As 3-MCPD esters are already formed at quite low temperatures (140°C), it is not possible to control or minimise their formation during deodorisation. Bleaching is therefore the most critical refining stage for the mitigation of 3-MCPD esters. Selecting the proper grade of bleaching earth (natural or non- HCl activated) is very important. Physical refining of freshly washed CPO with use of natural bleaching earth can give 3-MCPD ester levels between 1-2ppm depending on the CPO quality and the efficiency of the washing process.

Characteristics of 3-MCPD	
Toxicity	Carcinogenic (Non-genotoxic)
Precursors	Triglycerides, chlorine, Acid solution
Critical refining stage	Degumming, Bleaching
Stability	Can only be degraded with strong alkaline

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

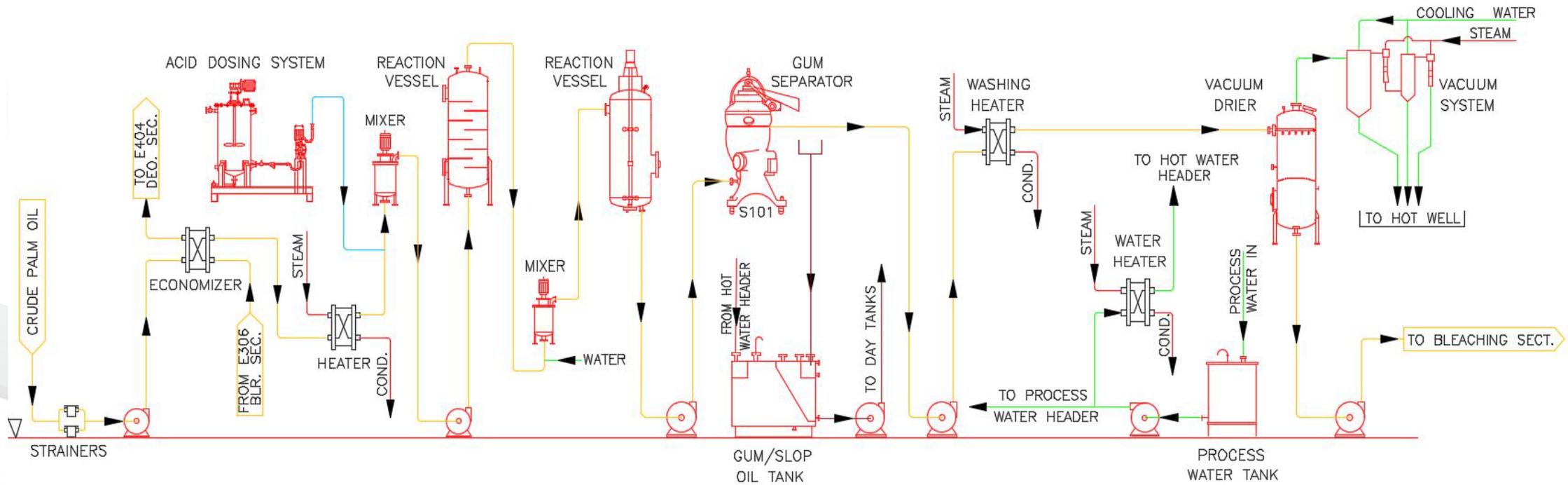
Economical Mitigation Technologies

Washing & degumming:

With a simple acid degumming & washing you can mitigate the formation of 3-MCPD and also reduce bleaching earth consumption considerably. The crude oil is initially heated to the optimum process temperature in a heat exchanger. A metering unit is used for adding a small quantity of phosphoric or citric acid, which is mixed intensively with the oil in a centrifugal mixer. After a brief reaction time, hot water is added and mixed. The heavy phase which contains phosphatides, proteins, pigments and other impurities is then separated. The oil which is treated in this way is generally sent directly to the bleaching stage and deacidified by means of distillation.

PFD FOR MIGTATION OF 3MPCD

PROCESS FLOW DIAGRAM FOR CRUDE PALM OIL DEGUMMING & WASHING SECTION



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

EST. - 1939

KUMAR

GEARED FOR PROGRESS

CROWN
EST. 1898

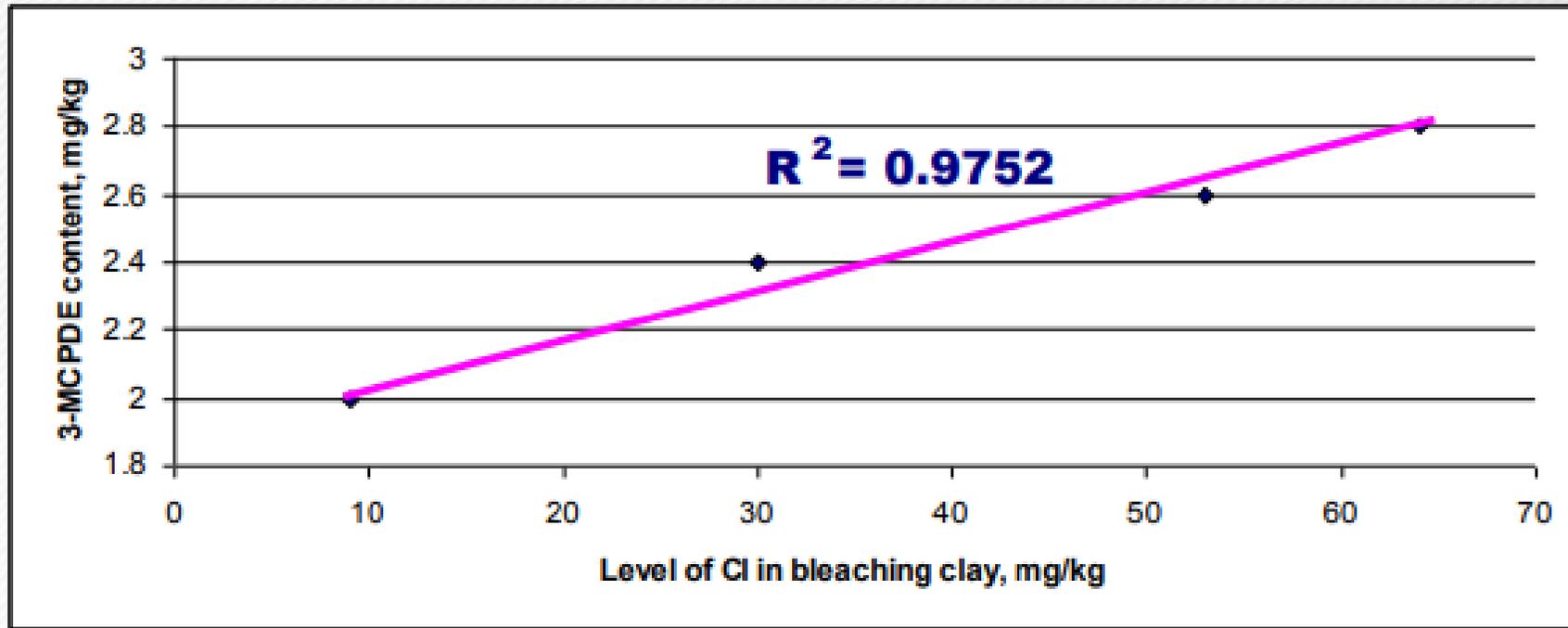
Economical Mitigation Technologies

Bleaching :

- pH and total chloride content of bleaching clay have positive correlation with the formation of the esters
- Natural bleaching earth to be used instated of activated clay
- Acidity of clays (pH)

Acid activated clays	pH
A1	5.8
A2	5.8
A3	5.3
Natural clays	
N1	6.6
N2	6.6
N3	7.7

Effect of Cl in bleaching clay



The level of Cl in b/clay shows positive correlation with the formation of the esters. This shows 3-MCPD content in oil increases with Cl in bleaching earth.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

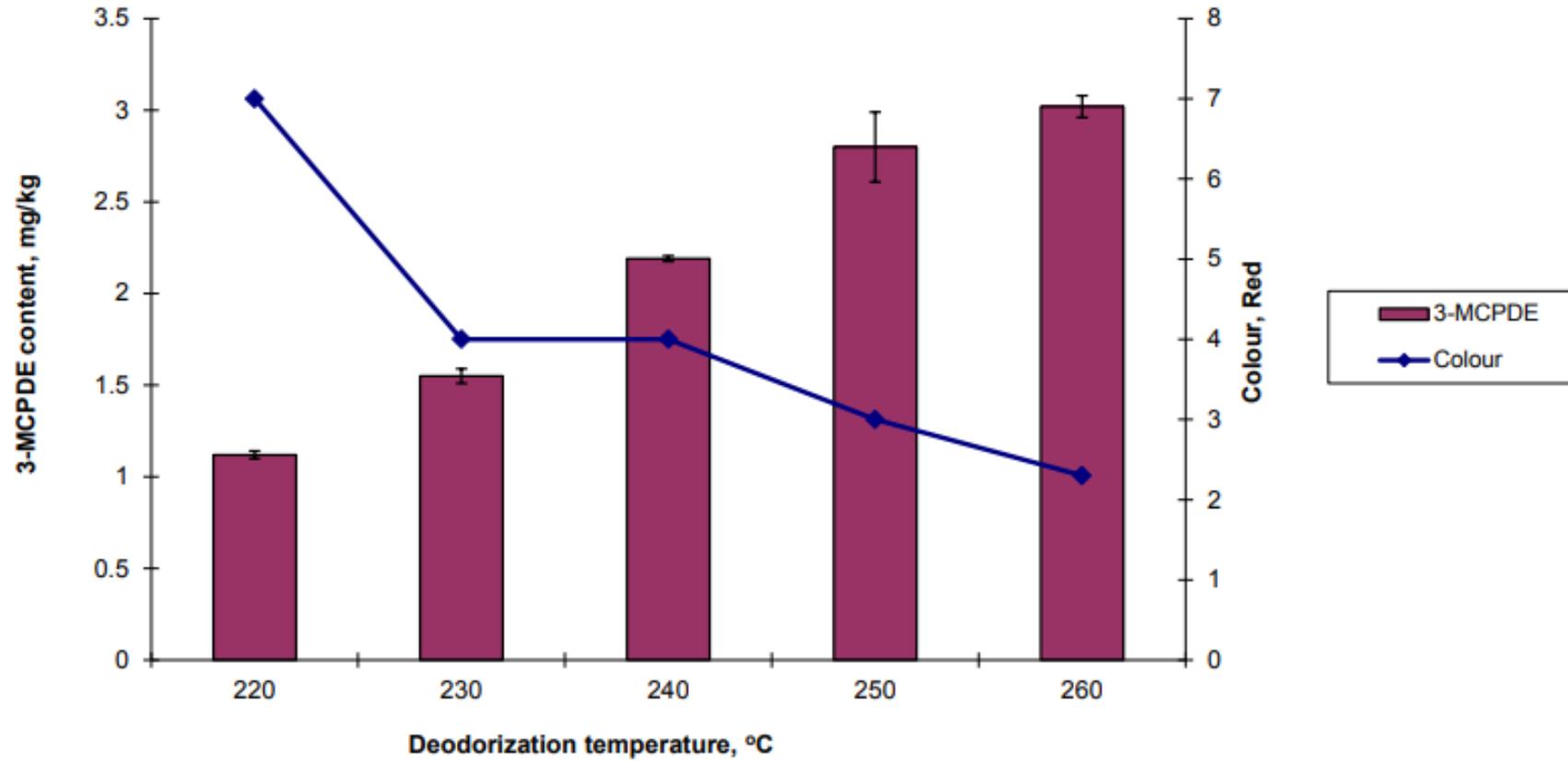
Economical Mitigation Technologies

Benefits at a glance

- Reliable reduction of 3-MCPD in refineries < 1 PPM
- Robust, tried and tested process technology
- Significant reduction of bleaching earth consumption
- Better end product quality
- Less fouling of downstream equipment

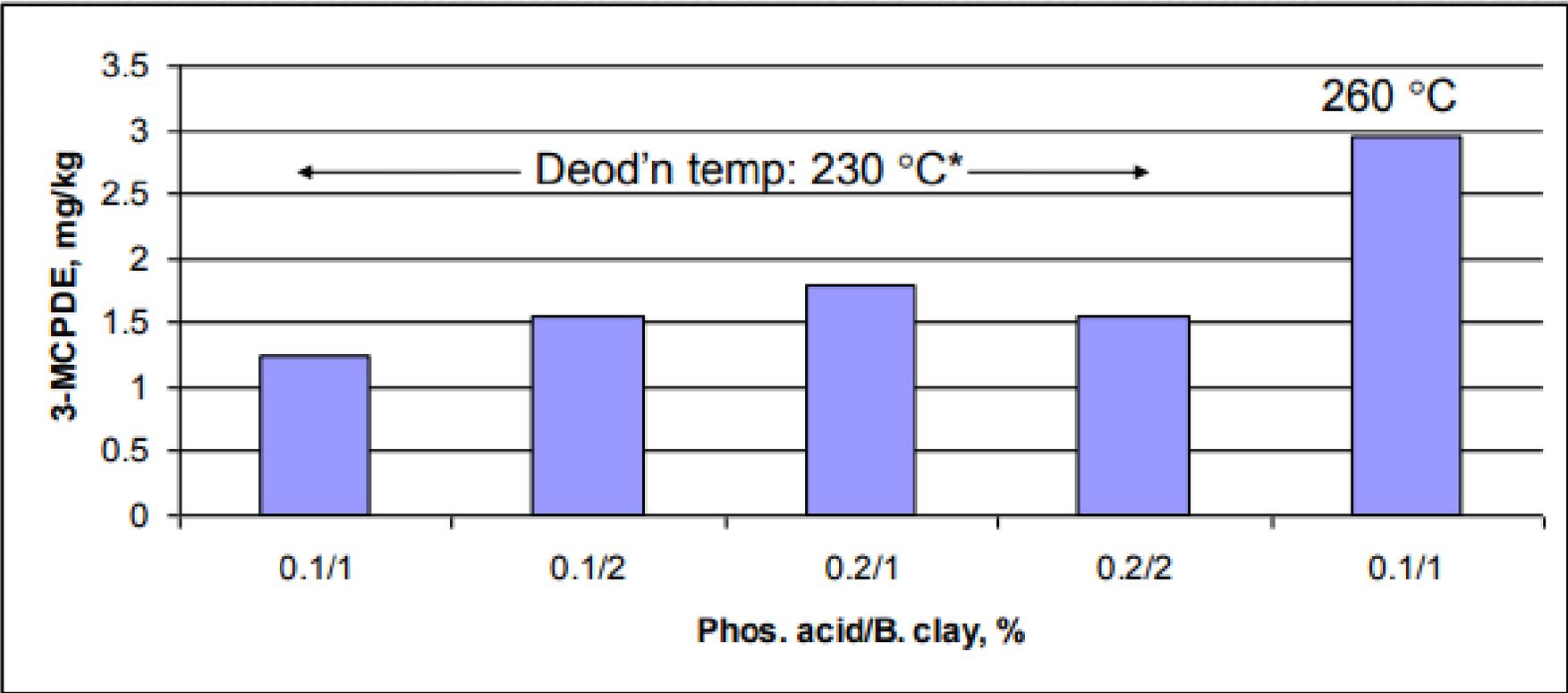
2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Effect of temperature



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Effect of deodorization temperature at 230 °C Variables: Phosphoric acid & b/clay



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

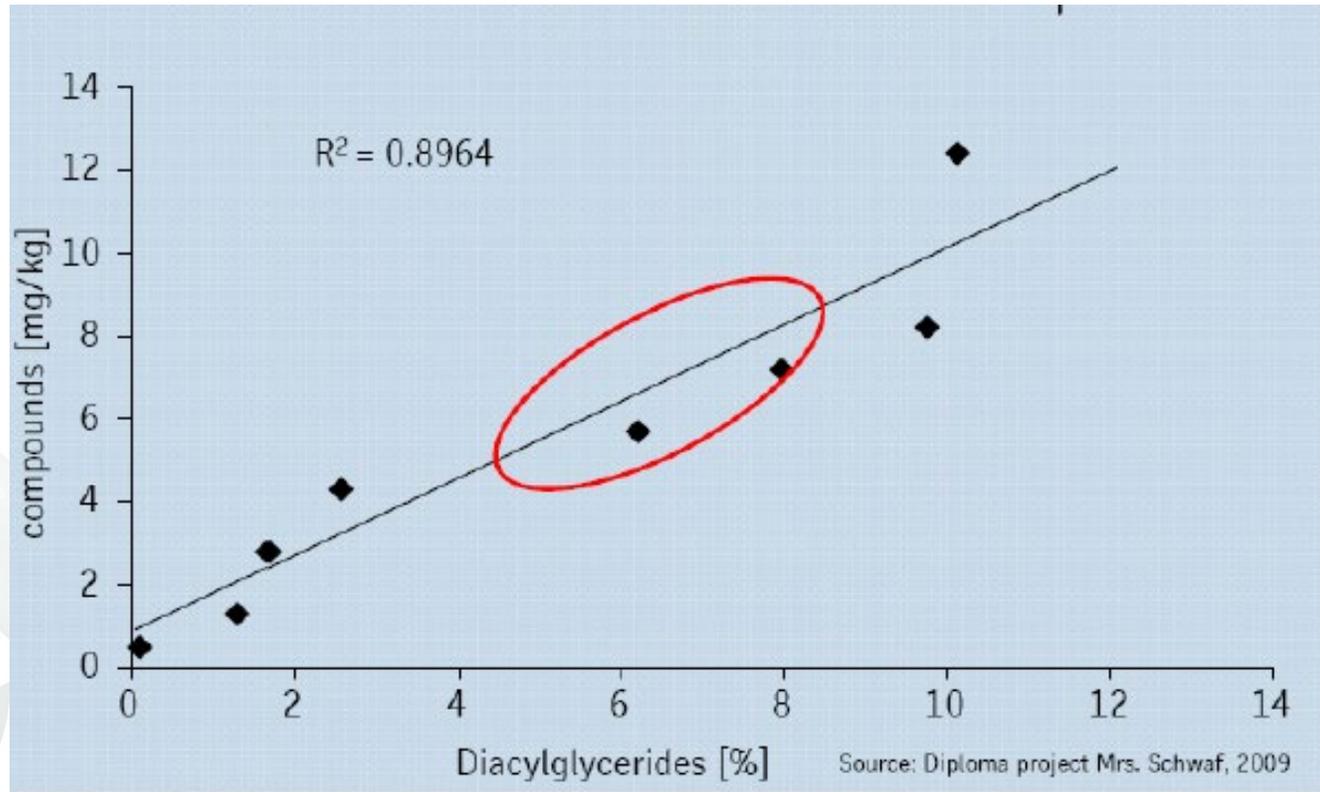
Glycidyl esters (GE)

Glycidyl esters are formed from compounds called diglycerides or monoglycerides, which are naturally present in all vegetable oils, when they are heated to temperatures $> 200^{\circ}\text{C}$ e.g. during the deodorisation stages of refining. GE are therefore present in refined vegetable fats and oils (particularly palm oil) and foods containing these such as biscuits, pastries and cakes, infant and follow on formula, margarine, fried or roasted meat and some chocolate (or similar) spreads.

Characteristics of Glycidyl Esters (GE)

Toxicity	Carcinogenic (Genotoxic)
Precursors	Diglycerides (DAG) & Heat
Critical refining stage	FFA Stripping & Deodorisation
Stability	Conversion to MAG with strong acid (ABE)

Effect of diglycerides on Glycidyl esters



The level of these contaminants is highest in palm oil because diglycerides make up between 4 to 12% of its composition.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

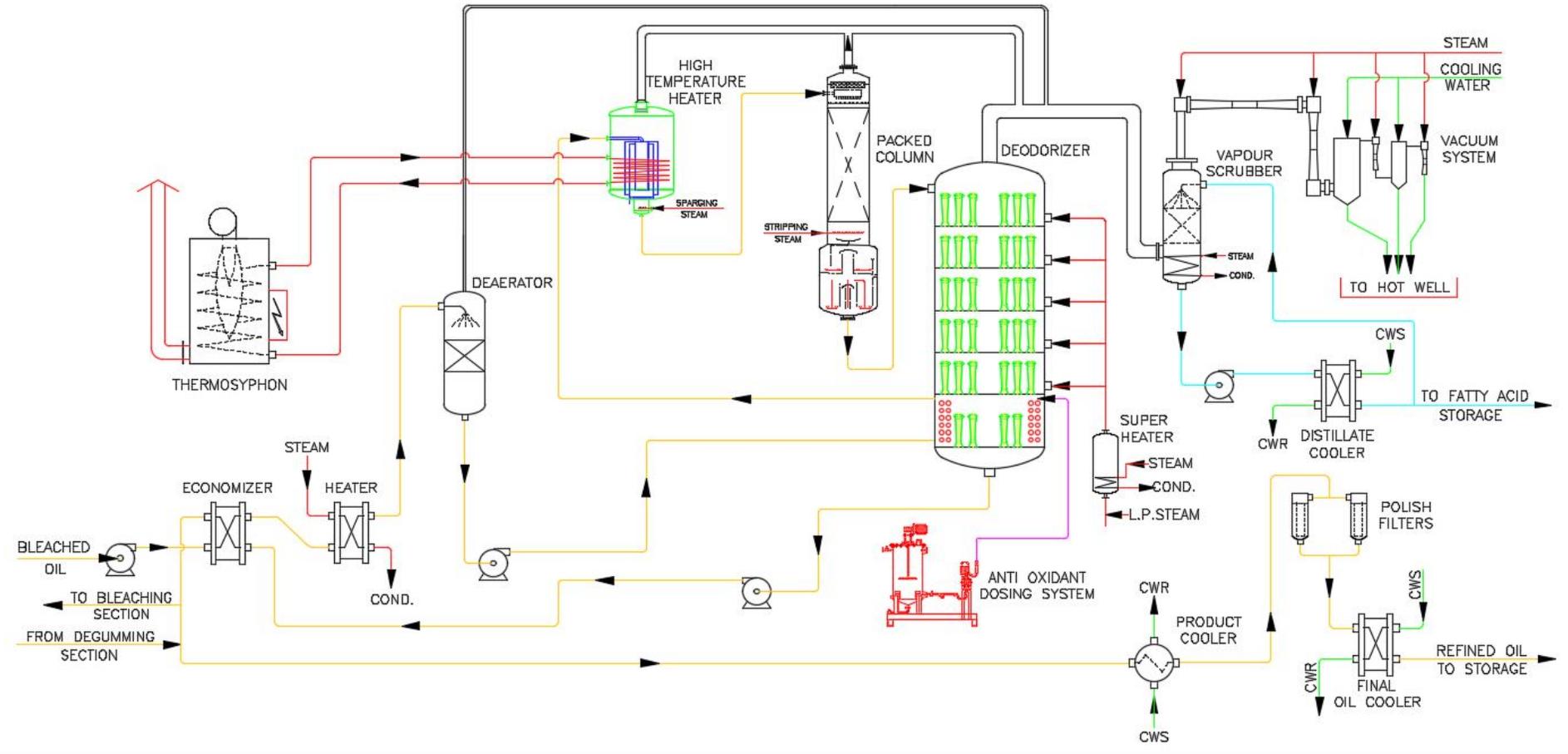
Economical Mitigation Technologies

Mitigation of GE

GE is the contaminant resulting from the diacylglycerides (DAG) reacting with high temperature. Majority of palm oils is physically refined for good processing economics. Bleached palm oil is heated to 260°C to stripped off free fatty acids and followed by the cooling of oils to <230°C for deodorization. When temperature for deodorization step is lowered, the GE in the refined oil will be reduced accordingly, however retention time must be increased to compensate less heat bleaching effect at a lower temperature. This gives very low GE levels (<0.5ppm) provided that deodorisation is done at a low temperature (maximum 230°C) with maximum retention time

PFD FOR MIGTATION OF GE

PROCESS FLOW DIAGRAM FOR CRUDE PALM OIL DEODORIZATION SECTION



2019-2020 ©



Comparison of CPO, Standard physical refining & Improved physical refining

Parameters	Crude Palm oil	Standard physical refining	Standard physical refining	Improved Physical Refining
		Activated BE 1%	Natural BE 1%	Natural BE 1%
FFA (% C16:0)	5	0.05	0.05	0.05
Color (Lovibond 51/4 “)	-	1.8R/23Y	2.0R/24Y	2.5R/32Y
3-MCPD (ppm)	-	4.21	1.25	1
Glycidyl esters (ppm)	-	3.12	2.94	0.5

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

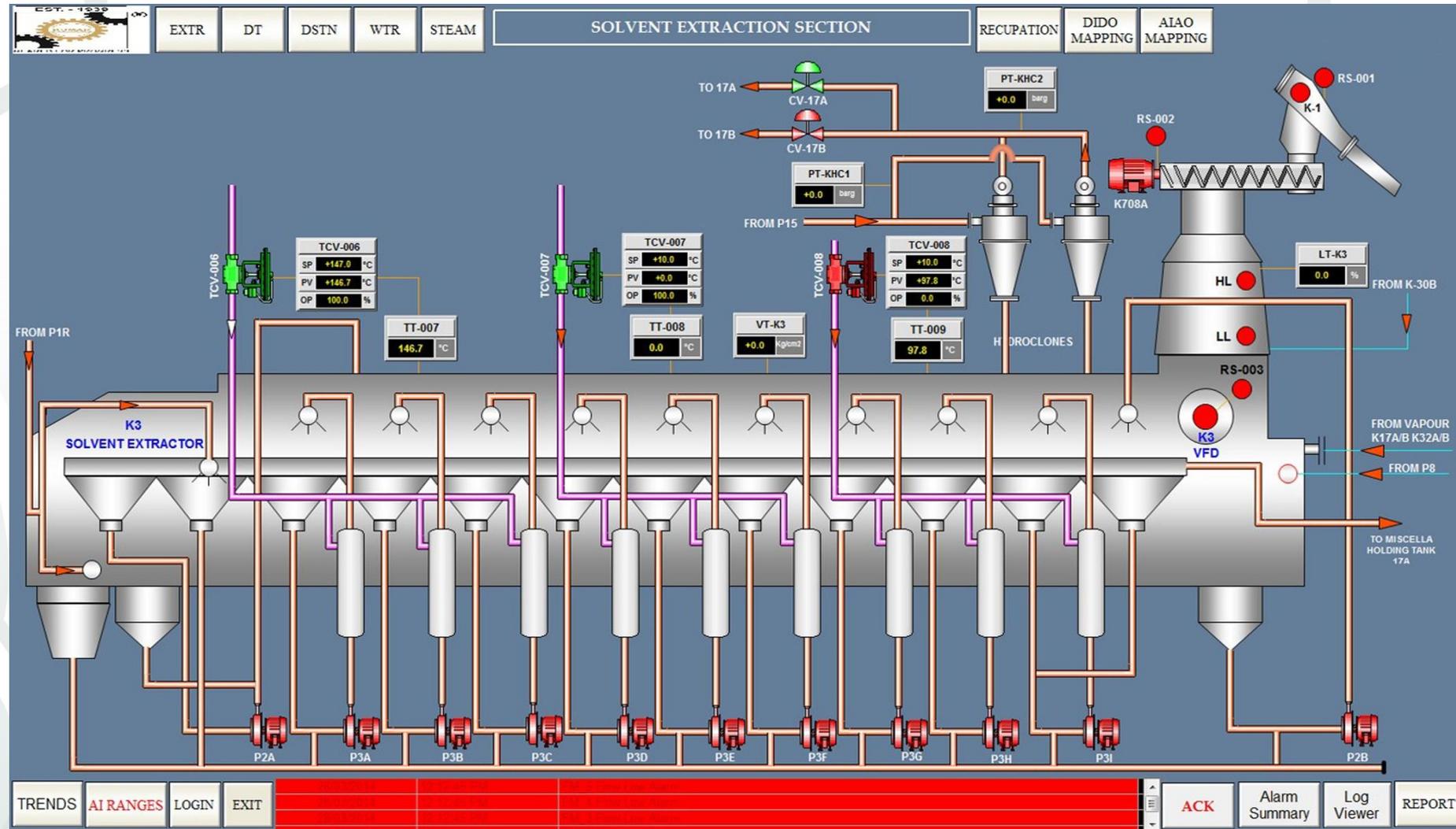
Kumar Plant & Process Automation Services

KUMAR Automation is with the state of the art instrumentation and Software for complete processing control from the Desk.

It can offer Off Site control trouble shooting through our Cloud based online system. The refinery can be operated from a remote control through internet and also rectification of the process can be carried out from the remote location.

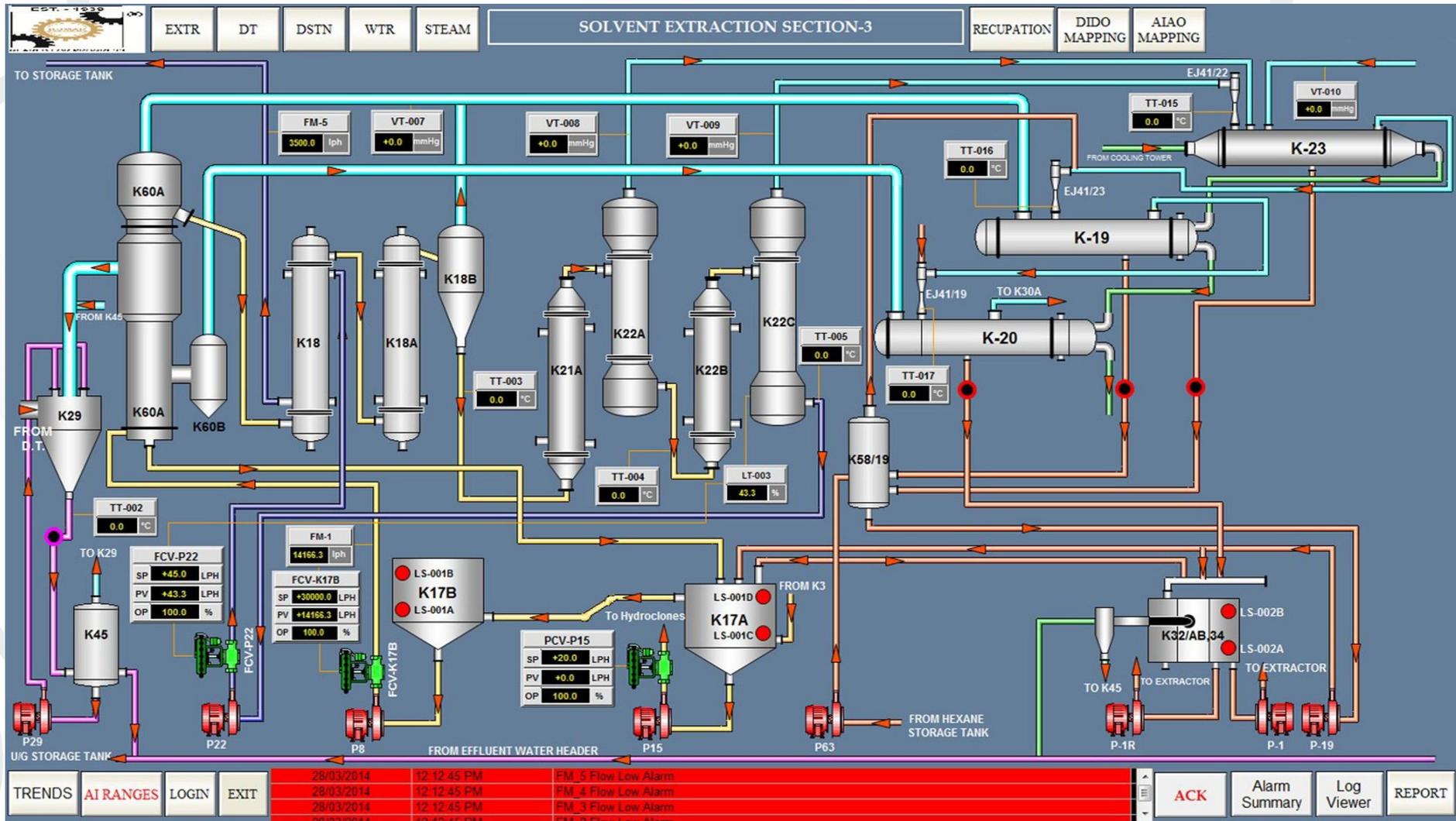
Process automation ensures better control of critical process parameters like steam, water and all other utilities and chemicals thus improving final oil quality and reducing human error. Through our automation you can control critical operation like the switching over of the pressure leaf filters as well, maintaining and sealing Vacuum in the deodorizer and also getting complete accountability of raw material coming into the plant and finished product going out, through our totalizer and mass flow meters.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.





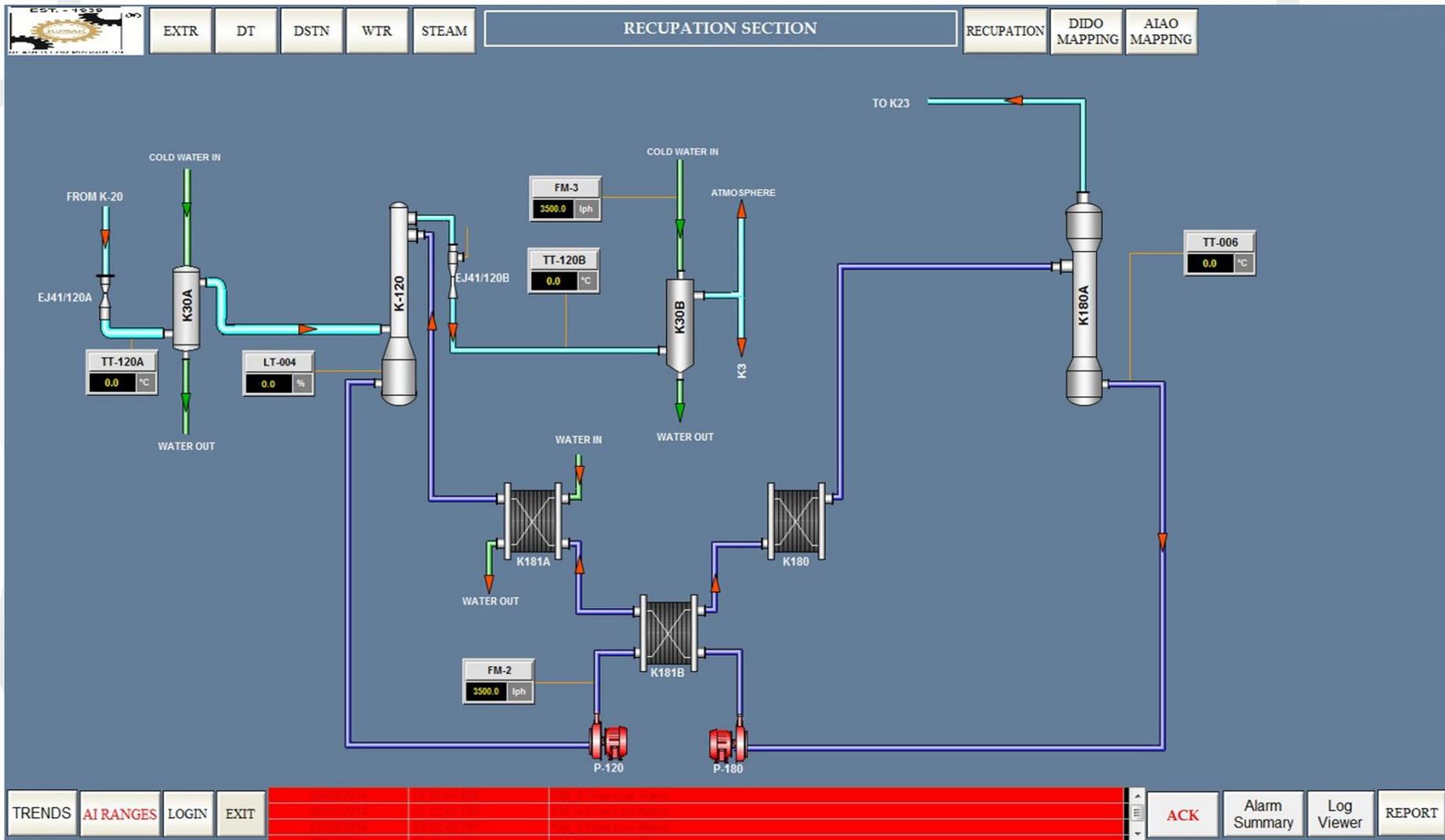
2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

EST. - 1939



GEARED FOR PROGRESS





2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Highlights of Kumar Plant

Optimum energy and utility consumption per MT of feed

Solvent Extraction Plants are designed confirming NFPA 36

Well designed and manufactured equipment as per applicable design code like ASME section VIII Div. 1 with high level of quality

All heat exchanger, coolers, condensers as per ASME section VIII Div 1, TEMA & Sound Engineering Practice (SEP) standards & Third party Inspections

Electrical motors, cable, control panels are confirming to IEC standards

Kumar systems are in accordance to Health and safety requirements as per international norms

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Highlights of Kumar Plant

- Project bought outs (like Motors, Gear Box, Pumps, Vacuum systems, Instruments, etc.) from reputed multinational companies like Siemens, E+H, KSB, Mazda (Croll Reynolds), Buhler, etc.
- Technical construction file of equipment comprising of QAP, Material Test Certificates, stage wise Inspection report, Final test reports, etc. is provided along with equipment supply.
- Turnkey Projects are executed by competent & experienced project team with proper monitoring of quality & schedule.
- Pre-Commissioning & product trials are carried out by experienced commissioning engineers to ensure proper operation to achieve desired product quality & rated capacity.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Expellers

- **PK Series**
- **Xpress Series**
- **New Super Press Series**
- **New Oil N Oil Series**

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Expellers – PK Series

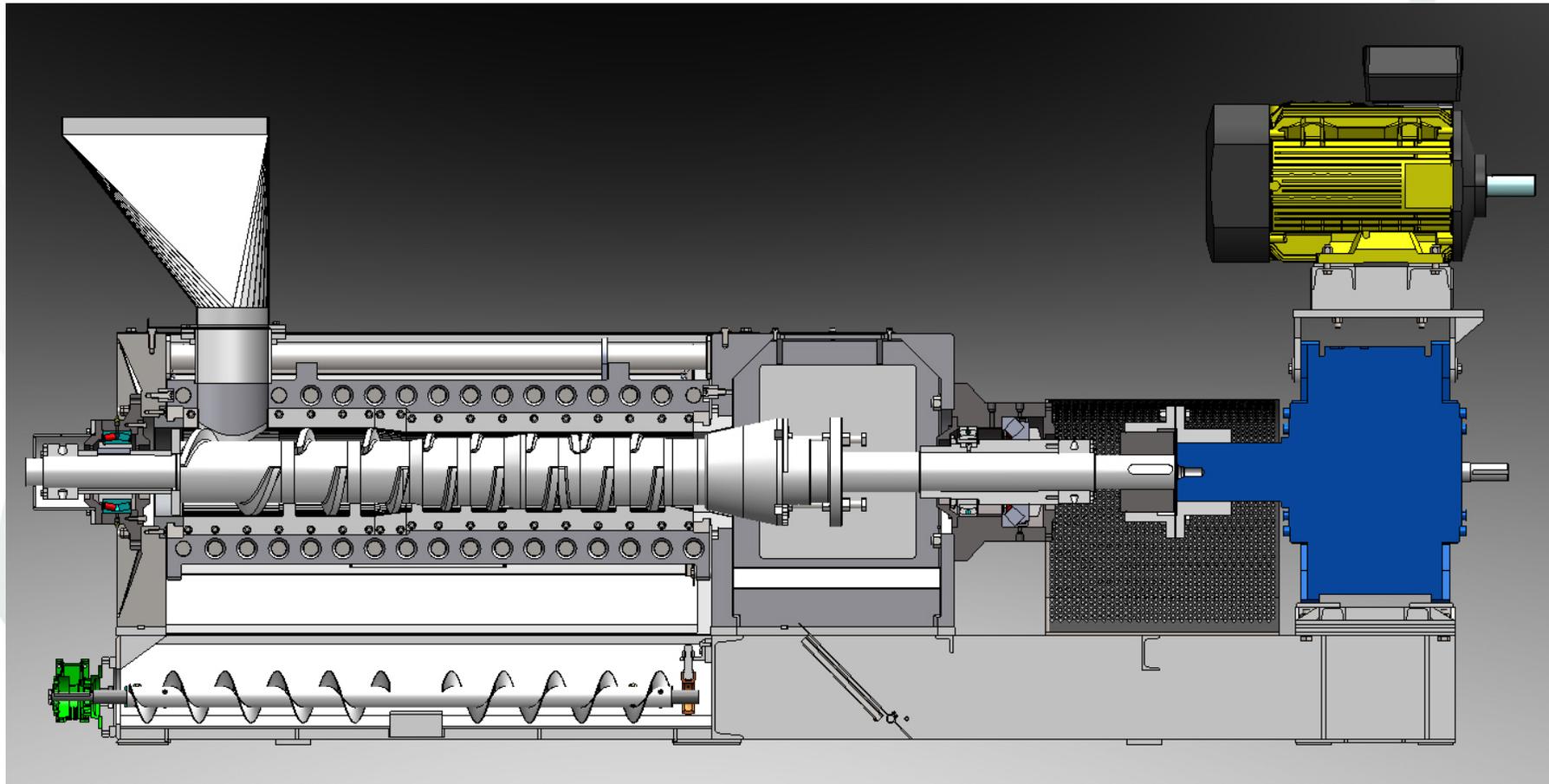
Specially designed and manufactured for extraction of Palm Kernel consisting of Fabricated single chamber expellers

TECHNICAL DATA	UNIT	FIRST PRESS		SECOND PRESS	
		PK-15	PK-25	PK-15	PK-25
Type		PK-15	PK-25	PK-15	PK-25
Chamber size (Dia X Length)	mm.	Φ178 x 640 L	Φ209 x 640 L	Φ178 x 640 L	Φ209 x 640 L
Capacity	MT/24 h	12/15	22/25	8/10	14/16
Residual oil in cake	%	18-20	18-20	8-10	8-10
Required power rating	Kw/HP	37/50	55/75	37/50	55/75
Approx. Wt.	MT	4.5	4.8	4.5	4.8



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Expellers – PK Series

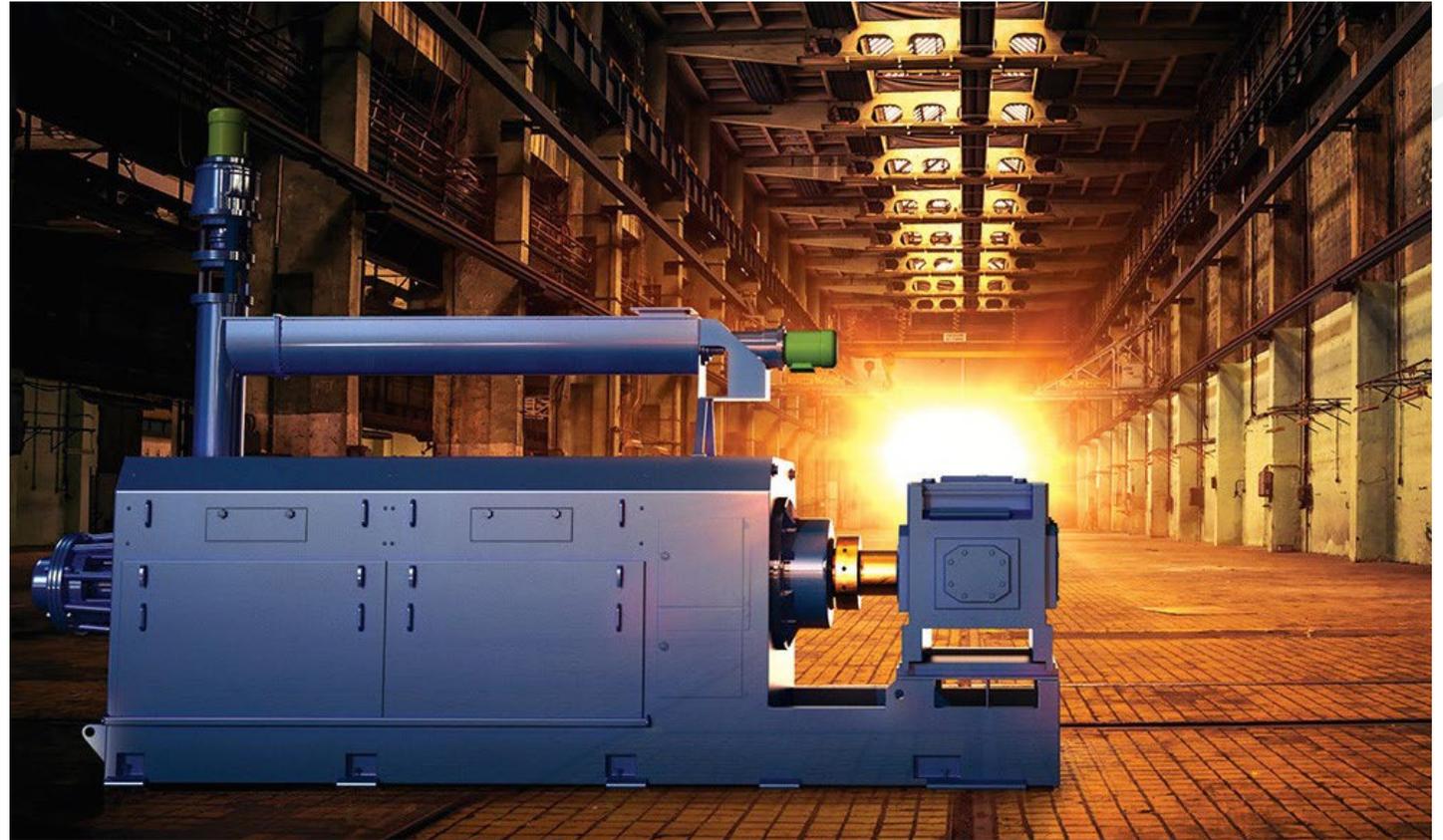


2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Expellers – X'Press Series

Largest of all series consisting of Steel cast Double chamber expellers with Horizontal & Vertical feeders

Designed for Prepress of Palm Kernel



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

EST. - 1939



Kumar Expellers – X'Press Series

TECHNICAL DATA			FULL PRESS		PRE-PRESS	
Type			XP-200	XP-250	XP-200	XP-250
Capacity	MT /24h		75-130*	90-150*	100-180*	120-200*
Residual oil in cake			7-10	7-10	16-20	16-20
		%				
Rated Power for Main motor	HP		215 / 335	250 / 335	215 / 335	250 / 335
Rated Power for Oil N Foots Conveyor	HP		1	1	1	1
Rated Power for Horizontal Feeder	HP		3	3	3	3
Rated Power for Vertical Feeder	HP		7.5	7.5	7.5	7.5
Chamber size	Feed	mm .	Φ 300 x 1300L	Φ315 x 1300 L	Φ 300 x 1300L	Φ315 x 1300 L
	Disch		Φ275 x 1350 L	Φ290x 1350 L	Φ275 x 1350 L	Φ290x 1350 L
Approx.Wt.		MT	17.5	18	17.5	18

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Expellers - New Super Press Series

Mid range expellers with double / Triple chambers designed to meet the needs of medium sized mechanical Extraction Plants



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Expellers – New Super Press Series

TECHNICAL DATA			FULL PRESS		PRE-PRESS	
Type			NSP IIB	NSP IIICLD	NSP IIB	NSP IIICLD
Capacity	MT /24h		22-25*	45-55	30-35	60-70
Residual oil in cake	%		7-10	7-10	16-19	16-19
Rated Power for Main motor	HP		75	150/175	75	150/175
Rated Power for Oil N Foots Conveyor	HP		1	1	0.5	0.5
Chamber size	Feed	mm .	Φ279.4 x 939.8 L	Φ330 x 939.8 L	Φ279.4 x 939.8 L	Φ330 x 939.8 L
	Middle		X	Φ279.4 x 584.2 L	X	Φ279.4 x 584.2 L
	Discharge		Φ209.5 x 863.6 L	Φ254 x 863.6 L	Φ209.5 x 863.6 L	Φ254 x 863.6 L
Approx.Wt.	MT		7.5	10	7.5	10

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Expellers - New Oil N Oil Series

Small to Mid range Single chamber expellers designed to meet the needs of small & medium sized mechanical Extraction Plants



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Expellers – New Oil N Oil Series

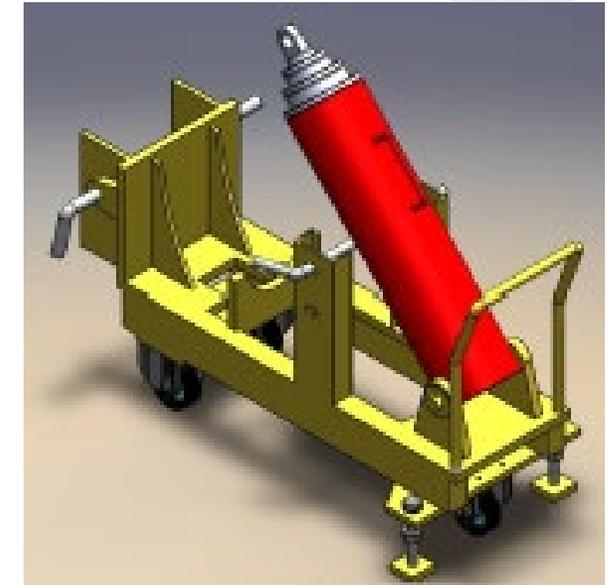
TECHNICAL DATA	UNIT	FULL PRESS		PRE PRESS
		NMK IVC	NMK VII	NMK VII
Type		NMK IVC	NMK VII	NMK VII
Capacity	MT /24h	10-12	25-30	30-40
Residual oil in cake	%	7-9	7-9	16-19
Rated Power for Main motor	HP	40	60/75	60/75
Rated Power for Oil N Foots Conveyor	HP	X	0.5	0.5
Chamber size (Dia. X Length)	mm.	178/222x 1117.6 L	Φ255/230 X 1565 L	Φ255/230 X 1565 L

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Expellers

Salient Features

- High efficiency External Gear Box.
- Sturdy Construction, low Investment and easy installation.
- Maximum Oil yield at low operating costs.
- Suitable to crush all type of edible and non-edible oil seeds.
- Easy and time saving main worm shaft removal without disturbing the gear box assembly.
- Vertical split hinged main cages provided with cage lifting for safe, quick and effortless maintenance.
- Maximum oil yield at low operating cost due to our chamber, cage bars and shims design
- Convenient height of worm shaft for easy maintenance.
- Easy worm shaft withdrawal without disturbing the expeller drive
- Hydraulic Chamber opening and closing reduce the manual effort & save time of the operator during maintenance.



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Expellers

Salient Features

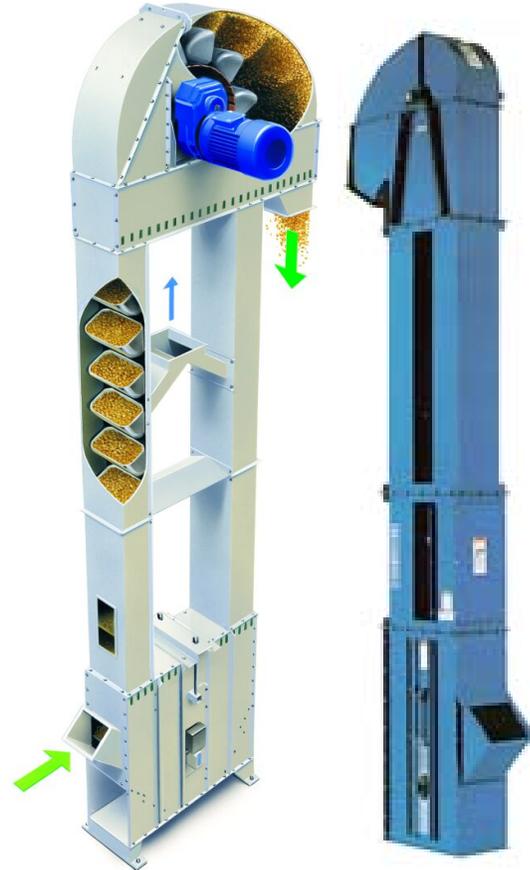
- We use special type of electrodes for hard facing which makes the life go on 3-4 times the normal electrode. This is a major recurring cost which goes down making it a faster return on investment.
- Hydraulic cone adjustment system – adjustment can be done while the expeller is in running condition, cake thickness is adjusted by control valves. It saves time as in manual operation you have to stop the expeller various time to adjust cone.
- Special designed locking type clamping bars and bolts to enable easy tightening & removal of the cage.
- Fully enclosed cage with a built in screw conveyor at the base for conveying oil and foots which keeps the shop floor neat and clean.
- Steel cast hobbing cut helical gears. Induction hardened, completely assembled on a single piece hollow driving sleeve with heavy duty roller and taper roller bearing to acquire perfect alignment and friction free for energy saving.
- Multistage vertical stack cooker for proper conditioning of the seeds.
- All the bearings are SKF/ZKL and are lubricated with the help of a special motorized pump to increase bearing life.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

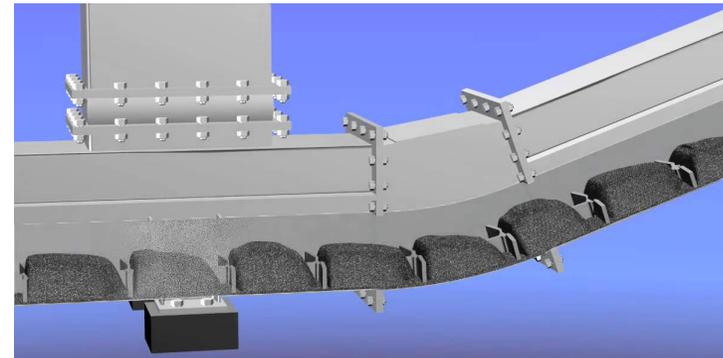
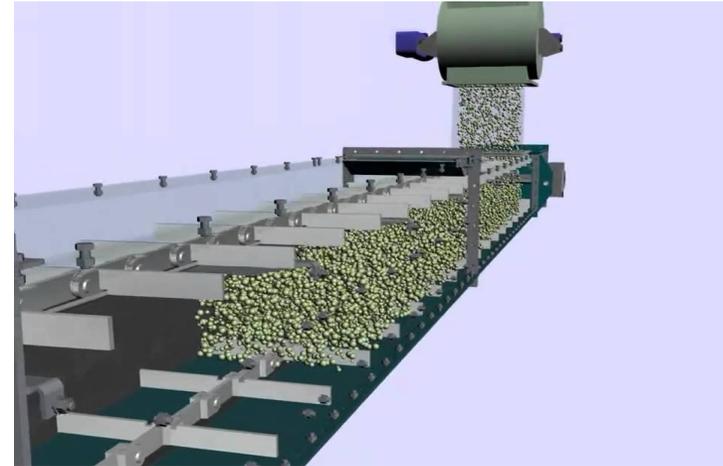
Kumar Material Handling Equipment



SCREW CONVEYOR
(U TROUGH/ PIPE TROUGH)



BUCKET ELEVATOR

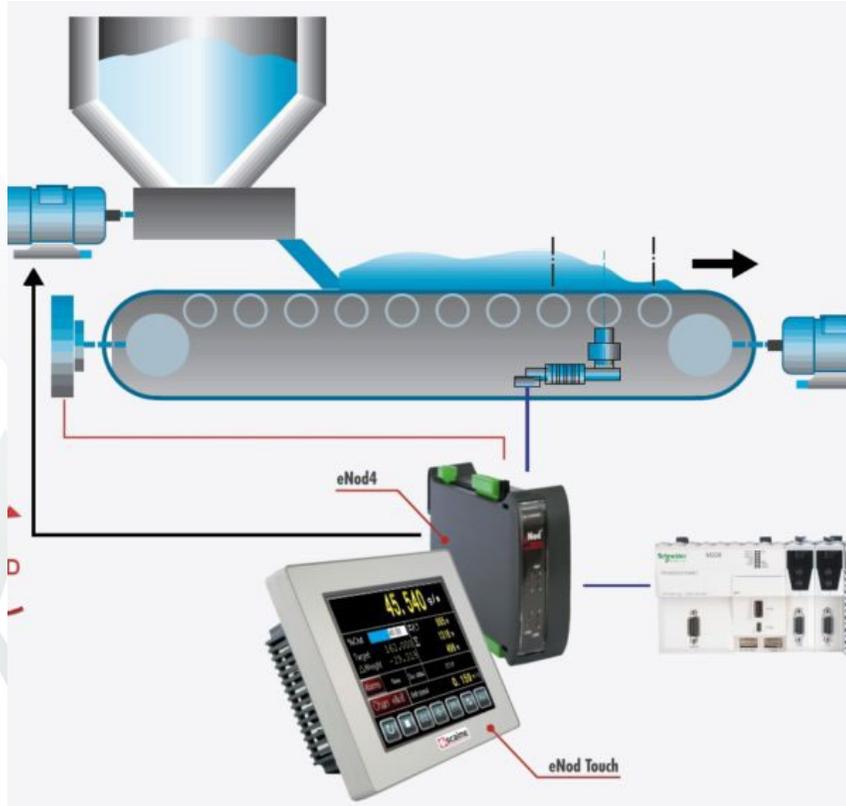


CHAIN CONVEYOR

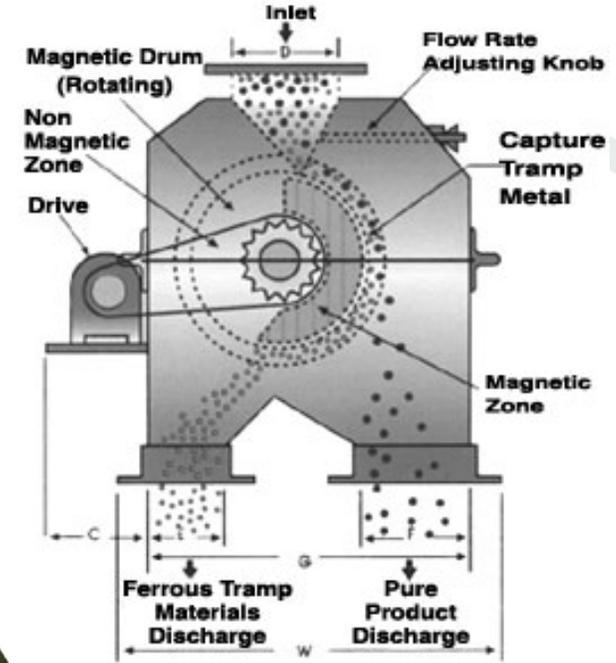
2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Preparatory Equipment

Online Weighing



Magnetic separator



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

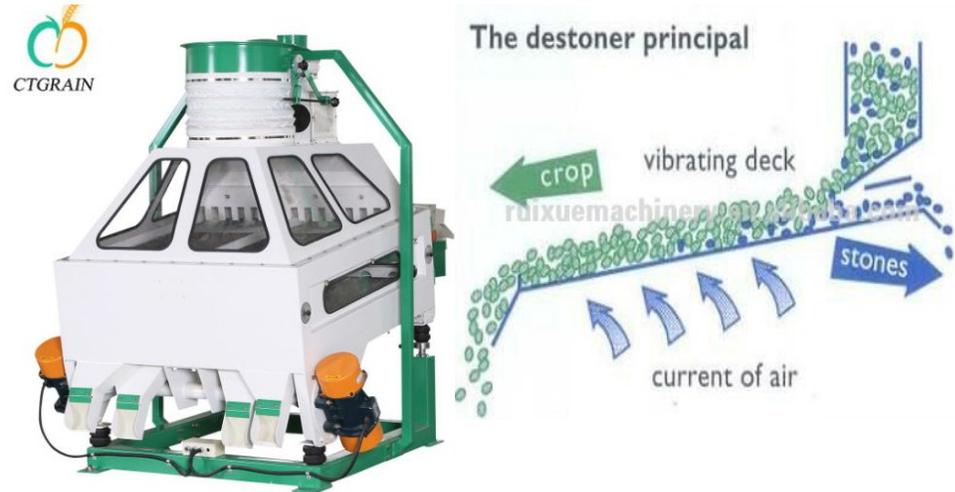
Kumar Preparatory Equipment

Seed Cleaner

Seeds are properly cleaned into seed cleaner to remove unwanted material like dust, leafs, steins etc. Then the seeds are subjected to Destoner to remove various sizes of stones / sand. This removal of unwanted material reduces the down time & increases the life of machines.

De-stoner

Vibratory type operating on vacuum principle. Steel box frame with sieve slope adjustment. Sieve box supported on rubber blocks with durable wooden sieve frames, covered with steel screens, aluminium baffles and cleaners. Complete with inspection windows and adjustable stone separation device. Includes cyclone, air lock and air fan.



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

EST. - 1939



Kumar Preparatory Equipment

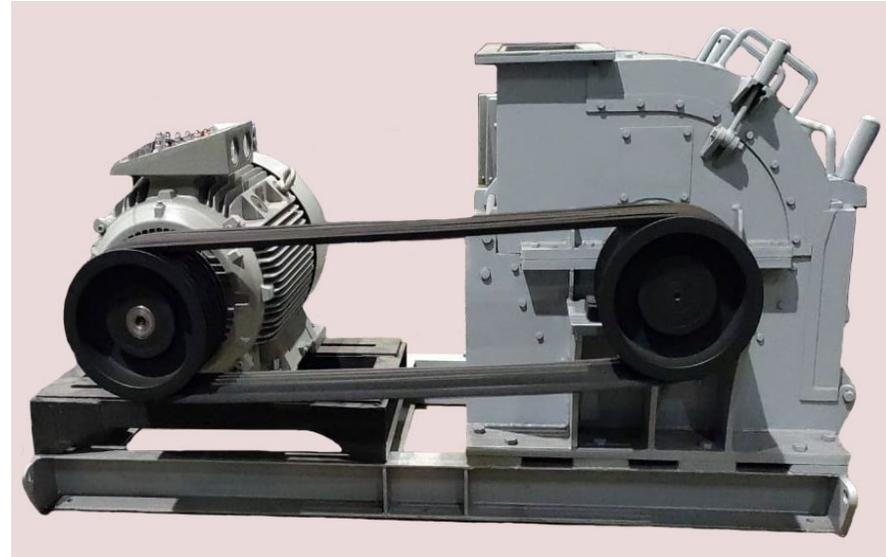
Decorticator

Decorticator is mainly used in separation of hulls from kernel in case of Groundnut. Use of Decorticator increases the capacity of Expeller and reduces the down time of the machine.



Hammer Mill

Hammer Mill is mainly used to disintegrate the product to desired size to have the proper Expelling. The Hammers (Beaters) are rectangular for efficient grinding & are made from hardened alloy steel.

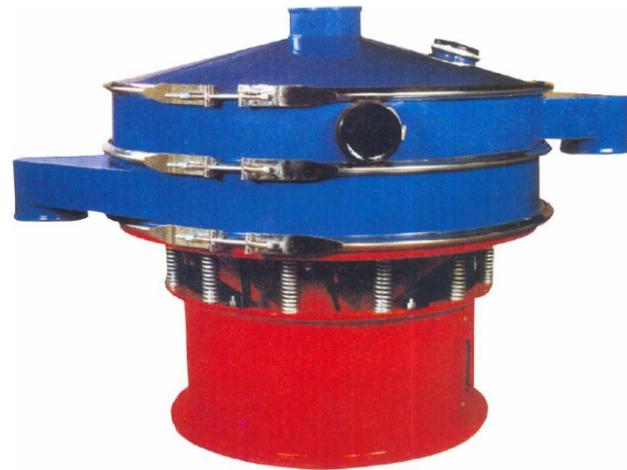


2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Separation / Preparatory Equipment

Vibro-Separator

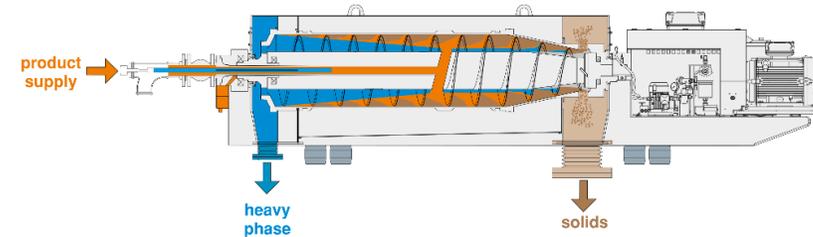
The Vibro Separator is a separating machine which includes a vertical type special motor to facilitate three dimensional composed circular and elliptic motions in horizontal, vertical & inclinational faces. The vibro separator achieves superior performance as the feed (Crude Oil) is dispersed from the centre equally; hence all parts of screen cloth are fully utilized.



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Decanter

Decanter is used for separation of foots from crude oil.



Kumar Solvent Extraction Plant

KUMAR SOLVENT EXTRACTION PLANTS FOR

Prepress / Full-press Cake like Palm Kernel, Shea, Sunflower, Groundnut, Cottonseed, Rape seed, Copra, Castor Seed, Niger.

Solvent Extraction Plants With Preparatory for Various Feeds like Soybean, Cottonseed, Rice Bran, Salnut, Pk, etc.

Specialty Solvent Extraction Plant For Essential Oils , Pine chips, polymers.

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Solvent Extraction Plant

General Steps

- Preparatory
- Solvent Extraction
 - Extraction
 - De-solventisation
 - Distillation
 - Recuperation
- Meal Cooling & DOC Bagging

Kumar Solvent Extraction Plant

Typical Parameters

- **Input specification**

Palm Kernel Cake

Oil content – 18 - 20%

Moisture – 6 - 8%

Impurities – 2 – 3%

- **Output Oil specification**

Solvent extracted Palm Kernel Oil

MIV – 0.25%

Phosphatides – 15-25 PPM

Un-saponifiable – 1 – 1.5

Peroxide Value - 5 -10 meq / Kg

FFA -5 % depending on quality of Palm Kernel

Cake

Kumar Solvent Extraction Plant

De-oiled Palm Kernel Cake

Moisture	–	10 - 11%
Residual oil in cake	–	1.0%
Hexane, ppm	–	< 500
Hexane consumption	–	2.0 – 2.5 kg/ton

2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Kumar Solvent Extraction Plant

Salient Features

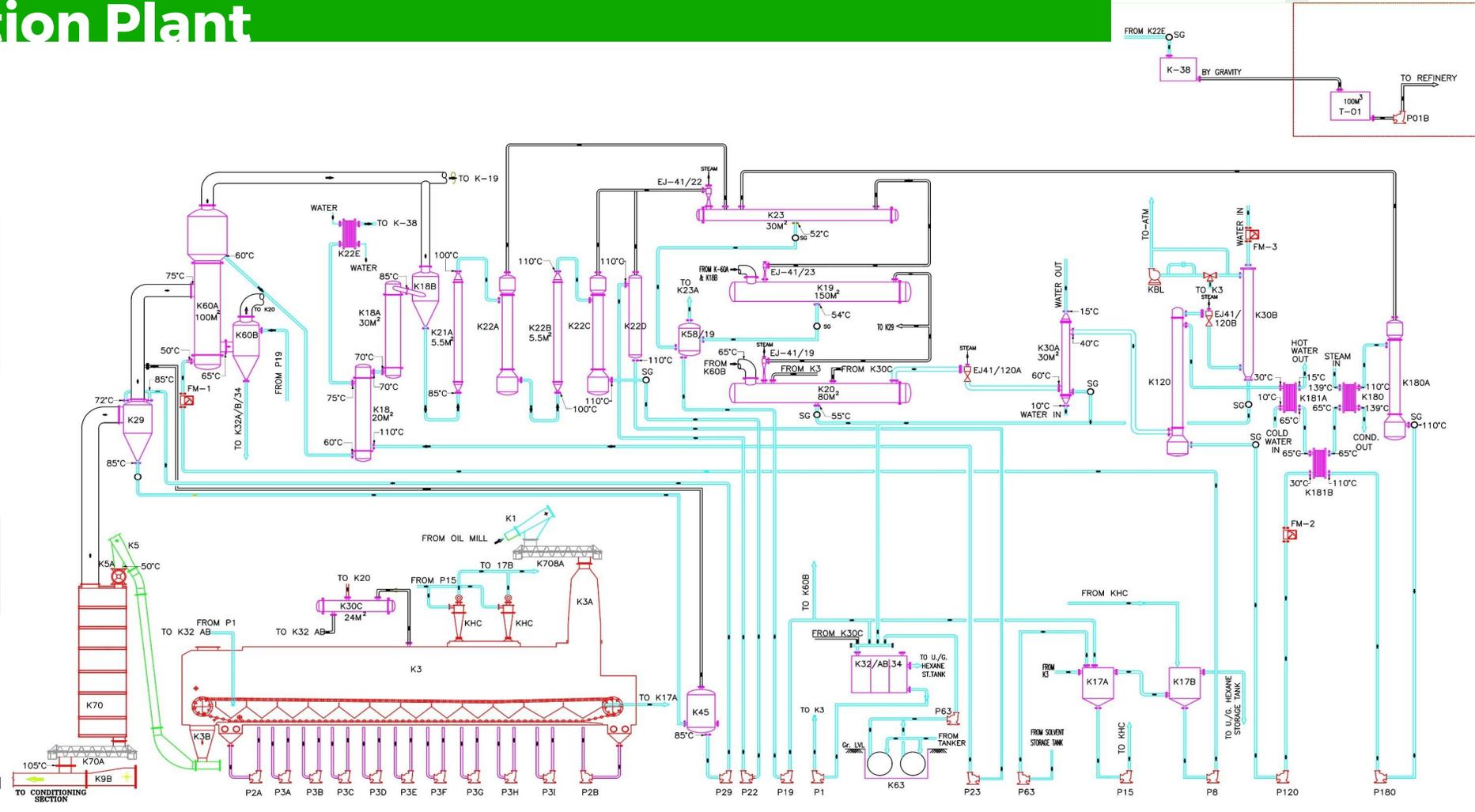
Solvent extraction consists of sequence of four operations:

- Physical removal of oil from prepared materials in Extractor
- Desolventizing toasting of the de-oiled meal
- Distillation for removal of the solvent from the extracted oil
- Solvent recovery for re-using of solvent in Extraction

The Solvent Plant is designed for optimum utilization of solvent & lower solvent losses

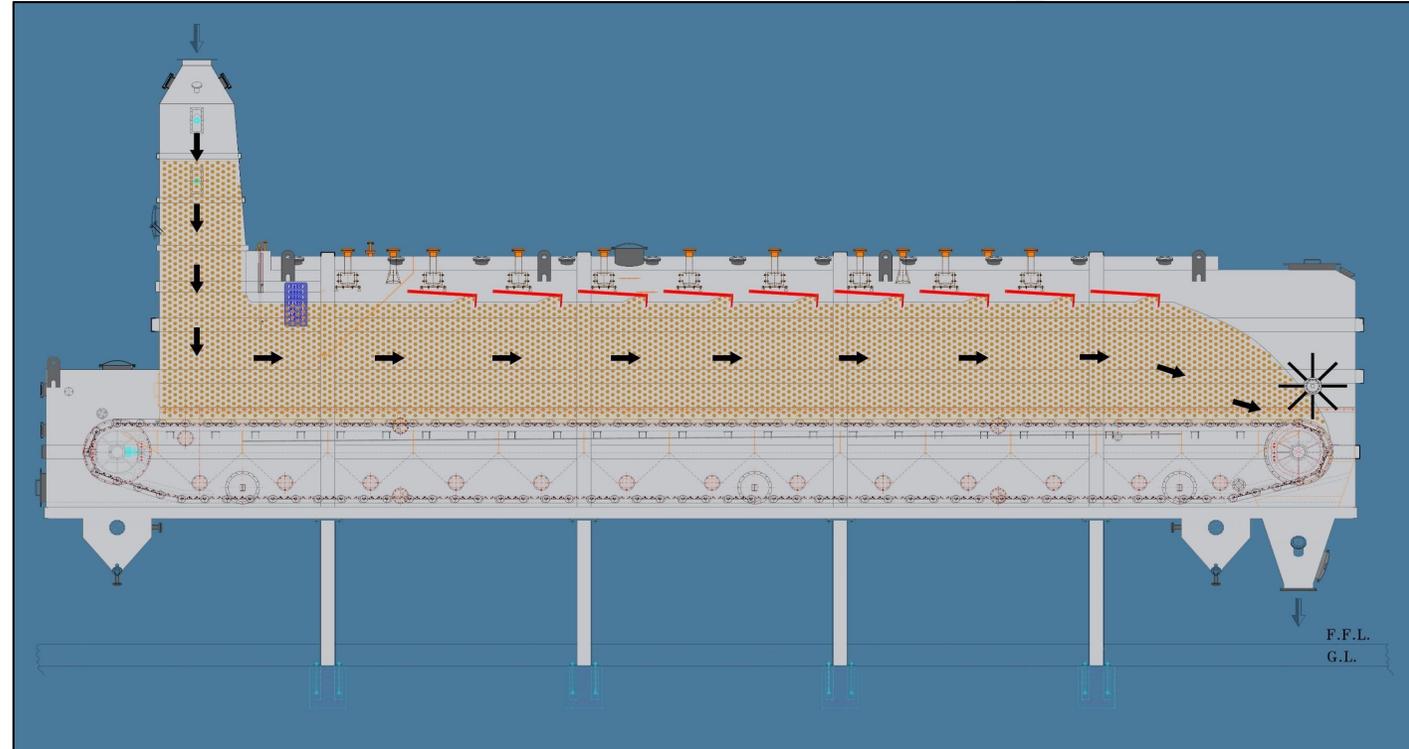
Solvent Extraction Plants are designed confirming NFPA 36

Process Flow Diagram for Kumar Solvent Extraction Plant



Kumar Typical Extractor

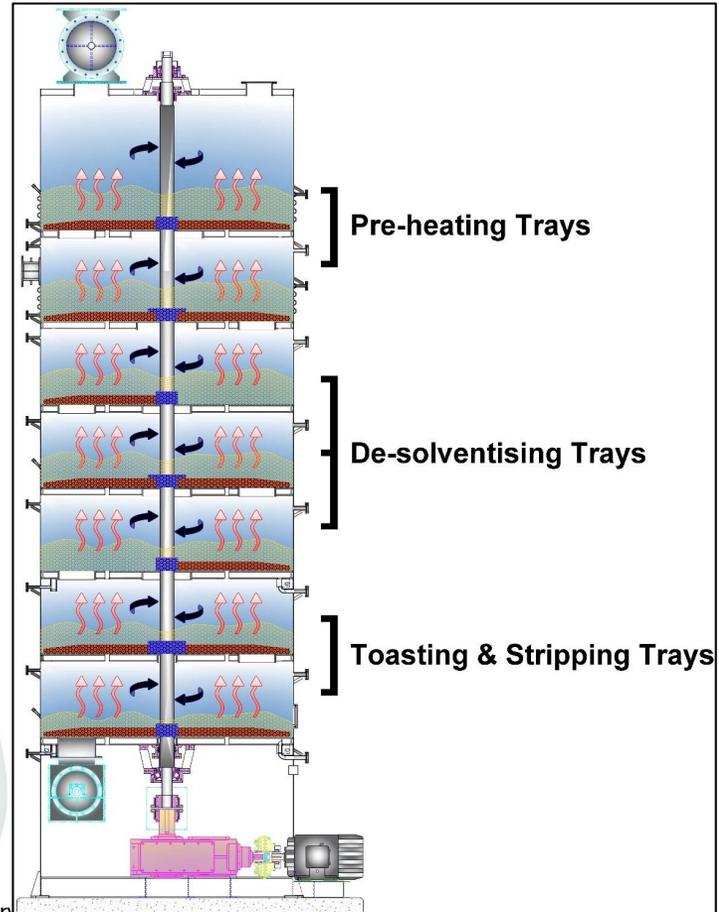
- Specially designed perforated SS wire mesh & cadre frame provided below the bed for proper solvent drainage and to reduce chocking there by improving extraction efficiency
- Extractor with single piece miscella hopper having no weld joints
- Extractor is delivered after successful no load trial runs at shops



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

Typical Kumar Crown Schumacher type De-solventizer-Toaster

- DT is specially designed with uniform counter flow system of steam distribution in the trays during de solventization – toasting & vapor separation.
- Specially designed sparge steam tray to facilitate better de solventization and uniform moisture addition for better toasting of meal.



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.

EST. - 1939



GEARED FOR PROGRESS



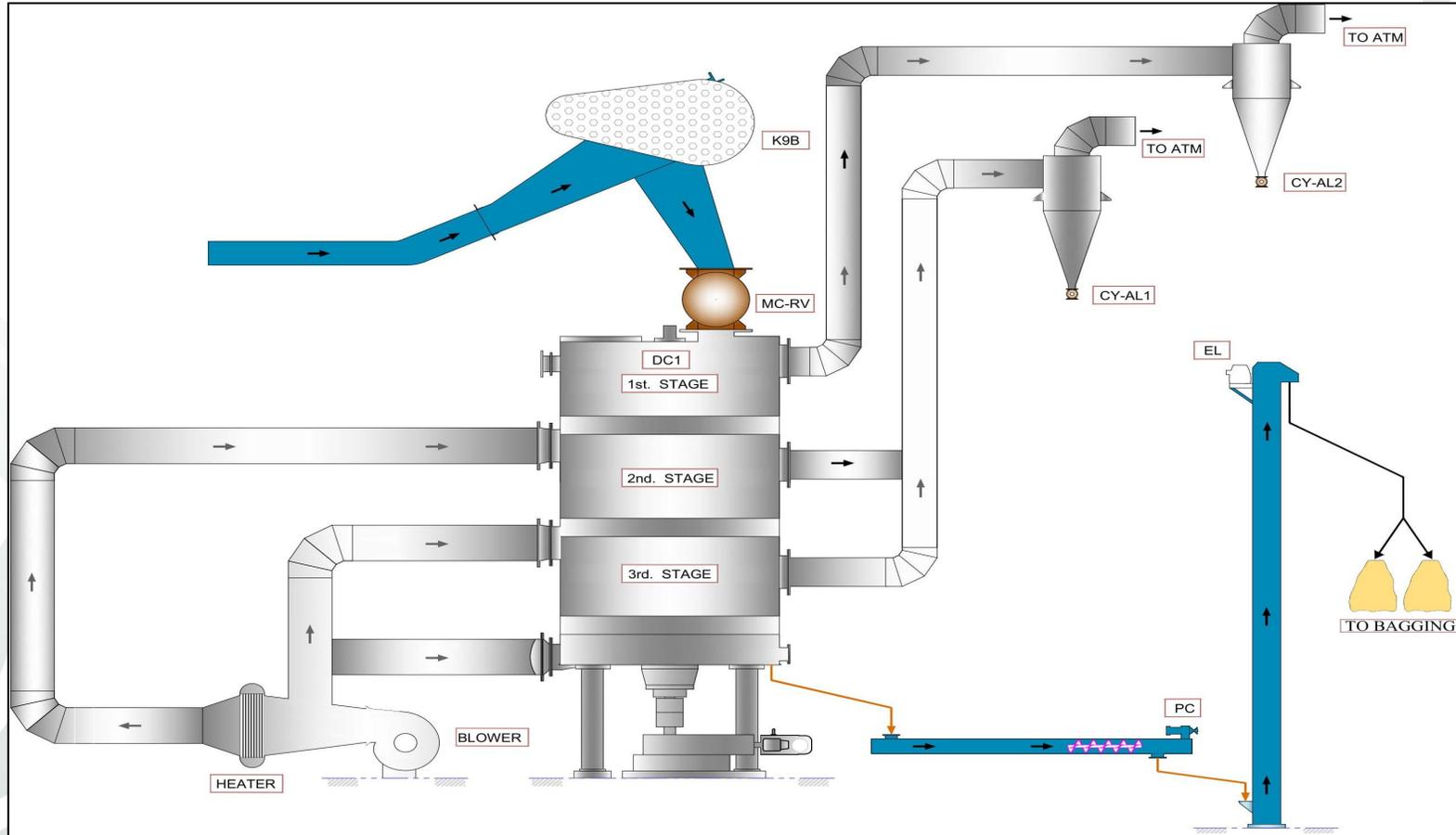
Kumar Extractor



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.



Process Flow Diagram for Kumar Meal Conditioning Section



2019-2020 © FEMEXPALMA | RSPO. Todos los derechos reservados.



**II CONGRESO
PALMERO
MEXICANO**

POR UN SECTOR PALMERO COMPETITIVO,
PRODUCTIVO Y SUSTENTABLE

**VIII CONFERENCIA
LATINOAMERICANA
RSPO**

M É X I C O 2 0 2 0

**Thank You
For Your Attention**

FEMEXPALMA

Federación Mexicana de Palma de Aceite

RSPO | Roundtable on
Sustainable Palm Oil

