USED OIL RE-REFINING UNIT PRESENTATION FOR 2000 MTPA CAPACITY

by

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PUNE

USED OIL RE-REFINING PLANT
2000 MTPY

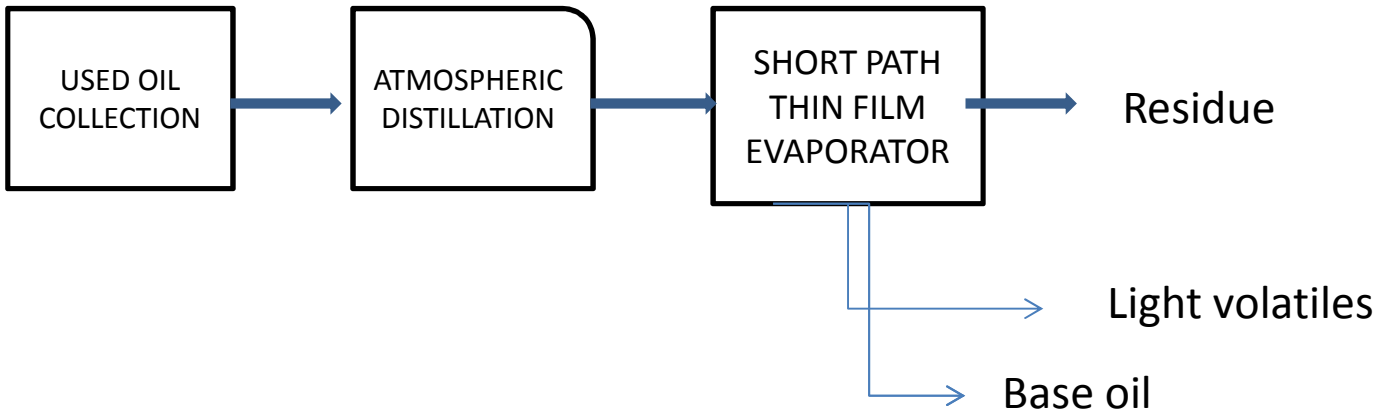
- CONTENT

1. FOREWORD
2. UNIT DESIGN
3. PROCESS DESCRIPTION
4. MATERIAL BALANCE
5. UTILITIES & CHEMICAL CONSUMPTION
6. UNIT DESCRIPTION & FLOW SCHEME
7. MODULES DESCRIPTION

USED OIL RE-REFINING PLANT 2000 MTPY

FOREWORD

THE PROPOSED MODULAR USED OIL RE-REFINING PLANT
IS A COMPLETE SKID MOUNTED FACILITY READY FOR IMMEDIATE INSTALLATION.
THESE PROPOSED MODULAR UNITS ARE PARTICULARLY ADVISABLE FOR SMALL REFINING CAPACITIES .
THEY FULFILL THE REQUIREMENT OF ENVIRONMENT FRIENDLY TECHNOLOGY OF SHORT PATH THIN EVAPORATION AS PROPOSED BY CPCB FOR GRANTING CONSENT TO RECYCLERS, RE-REFINERS OF USED OIL



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UNIT DESIGN
THE REREFINING UNITS ARE DESIGNED TO OBTAIN HIGH QUALITY BASE OIL
WE USE SPECIAL ENTRAIPMENT SEPERATORS (PATENT PENDING) FOR SEPERATION OF CARBON IN OIL FROM VAPOURIZED DISTILL PHASE.

WASTE /USED OIL CHARACTERISTICS
THE TYPICAL COMPOSITION OF THE FEEDSTOCK ARE

COMPONENTS	
WATER & LIGHT ENDS	15-25 %
LIGHT OIL	6-8 %
LUBE OIL FRACTION	70-75 %
RESIDUE	5 -7 %

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CHARACTERISTICS	INPUT USED OIL
COLOUR AS PER ASTM D1500	8
WATER	15%
DENSITY	0.85 TO 0.95
KINEMATIC VISCOSITY Cst at 100^C	1 to 32
DILUTENTS	15% VOL
NEUTRALISATION NUMBER	3.5 mg KOH/g
SAPHONIFICATION NUMBER	18 mg KOH/g
TOTAL HALOGENS	4000 ppm
POLYCHLORINATED BYPNENYLES	BELOW DETECTION LIMIT
LEAD	100 PPM
ARSENIC	5 PPM
CADMIUM+NICKEL+CHROMIUM	500 PPM
POLYAROMATIC HYDROCARBONS	6%

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FINISHED PRODUCT PRODUCED WILL MATCH THE SPECIFICATION FOR RAW MATERIAL (OIL) FOR BELOW DEFINED STANDARDS AND WILL BE FURTHER USED BY REGISTERED OIL COMPANIES HAVING ISI CERTIFICATE MARK

SR.NO	ISI SPECIFICATION AS SPECIFED
1	IS 9048:1982 SPECIFICATION OF RE-REFINED AUTOMOTIVE INTERNAL COMBUSTION ENGINE LUBRICATING OIL (FIRST REVISION)
2	IS 13656 : 1993 INTERNAL COMBUSTION ENGINE CRANKCASE OILS (GASOLINE AND DIESEL)
3	PLEASE REFER ATTACHED ECOMARK SPECIFICATION DOCUMENTS FOR OTHER OIL SPECIFICATION

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EFFULANTS

LIQUID WASTE EFFULANTS

CONSISTS OF DISTILLED EVAPORATED WATER FROM ATMOSPHERIC DISTILLATION .

THIS WATER CONDENSED & STORED IN CONDENSOR STORAGE TANK & THEN TRANSFERRED TO WATER CIRCULATION TANK AFTER IT COOLES TO AMBIENT. EXCESS WATER GENERATED OVER & ABOVE THE TOPUP WATER IS USED FOR GARDENING.

THE SPECIFICATION OF WATER WILL BE CHECKED AT REGULAR INTERVALS FOR :

IRRIGATION & INDUSTRIAL COOLING	**WATER CLASS E**	**PH BETWEEN 6 TO 8.5** **Electrical Conductivity at 25oC micro mhos/cm Max.2250** **Sodium absorption Ratio Max. 26** **Boron Max. 2mg/l**

AIR POLLUTION

THE UNIT DOES NOT PRODUCE ANY GASEOUS EFFULENTS AS ELECTRICAL POWER IS USED FOR HEATING . THE VOCS COMING OUT OF ROTARY OIL SEALED PUMP DISCHARGE IS PASSED THROUGH THERMAL OXIDISER AND BAFFLE TRAP BEFORE DISCHARGE TO ATMOSPHERE.

HAZARDOUS WASTE GENERATED (MAX 2% OF INPUT CAPACITY) IS

CARBON RESIDUE TRAPED IN ENTRAPMENT SEPERATOR

METALLIC BURR TRAPED IN INLET FILTER

MEMBERSHIP OF CHWTSDF FACILITY IS TO BE TAKEN WHERE THIS HAZARDOUS WASTE WILL BE DISPOSED.

THE HAZARDOUS WASTE WILL BE STORED IN M.S DRUMS IN ENCLOSED SHED & SENT TO CHWTSDF FACILITY

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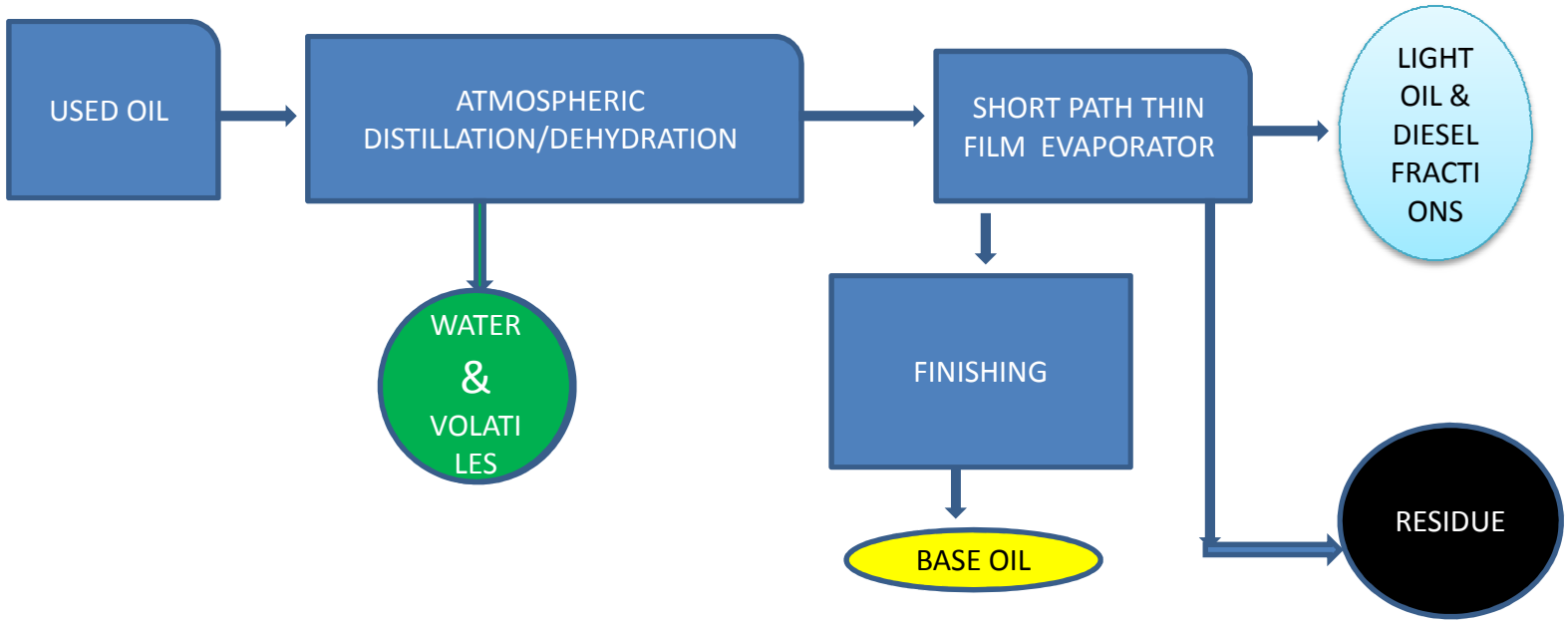

BLOCK DIAGRAM OF RE-REFINING SETUP

ATMOSPHERIC & MODERATE VACUUM DISTILLATION TO REMOVE WATER & LIGHT VOLATILES

THE OIL IS SUCKED INTO TOP TANK NO 1 OF 225 LITER CAPACITY THE OIL IS ALSO SUCKED IN TOP TANK OF 225 LITER CAPACITY UNDER VACUUM USING A 40 NB HYDRAULIC HOSE AFTER COMPLETE FILLING OF OIL IN THE TANKS VACUUM IS RELEASED & SYSTEM IS TAKEN TO ATMOSPHERIC PRESSURE
THE OIL IN TOP TANK IS HEATED TO >95 ^C. THE WATER EVAPORATES & CONDENSES INTO THE CONDENSOR .
THE INTERNAL CIRCULATING WATER OF CONDENSOR OUTLET IS CIRCULATED THROUGH TANK NO 1 TO LET THE OIL SOAK UP THE HEAT OF RETURN LINE HOT WATER. THIS RETURN LINE HOT WATER HEATS UP THE INPUT OIL TO 95 ^C IN 45 MINUTES AFTER START OF INITIAL BATCH.
THE TOP TANK AFTER REACHING 95 ^C IS FURTHER HEATED TO 150 ^C UNDER VACUUM OF 120 TORR. ALL TRACES OF DILUTENTS,WATER ,PAH ARE REMOVED & CONDENSED IN CONDENSOR. THEY ARE SEPERATED BY GRAVITY SEPERATION IN TANK.
THE DEHYDRATED & MODERATELY DISTILLED OIL IS STORED IN MIDDLE TANK NO .2 FOR FURTHER SUPPLY TO SHORT PATH THIN FILM EVAPRATOR
THE DEHYDRATED/DEGASSED USED OIL SEPERATES OUT INTO LIGHT OIL,BASE OIL,RESIDUE OIL.

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THE THIN FILM EVAPORATOR CONSISTS OF VERTICAL CYLINDERICAL SURFACE ENCLOSED BY HEATERS & INSULATION JACKET AND AN INTERNAL ROTOR WHICH DISTRIBUTES A THIN LAYER OF OIL ON THE HEATED WALL ,BY MEANS OF ROTATING BLADES.

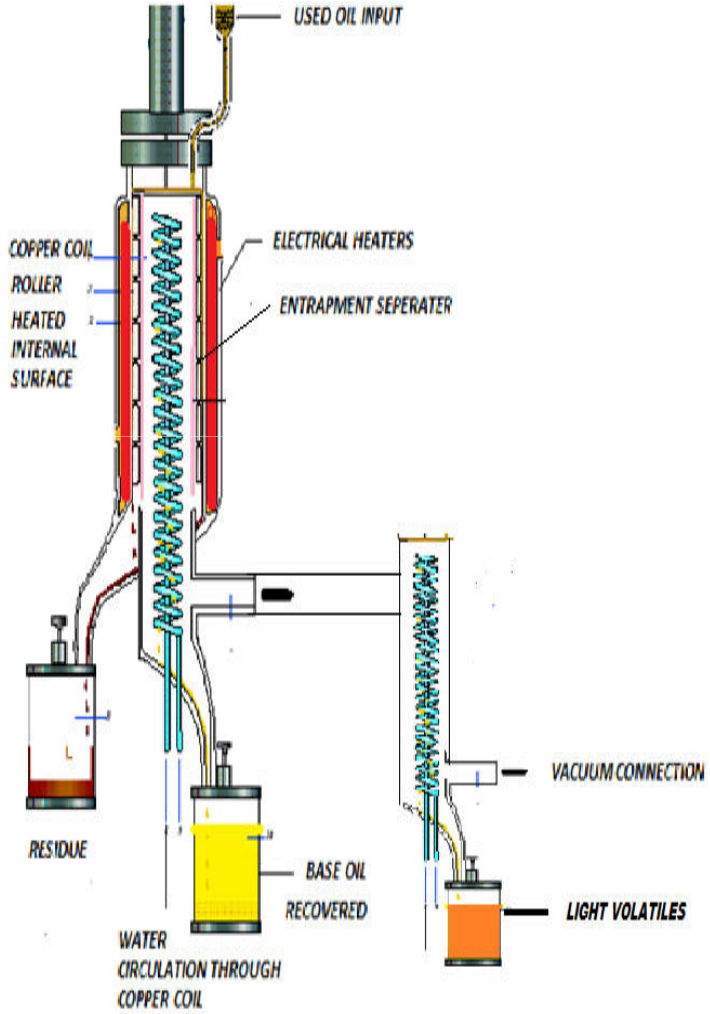
BY THE ACTION OF ROTOR (ELECTRICALLY DRIVEN) AN HIGH TURBULANCE & BACK MIXING OCCURS IN THE THIN LAYER OF OIL FILM.

THE MAIN FEATURES OF THE EVAPORATOR ARE :

SHORT RESIDENCE TIME (IN THE ORDER OF 10 SECONDS) BY MECHANICAL AGITATION OF OIL ON THE HEAT TRANSFER SURFACE

HIGH HEAT TRANSFER RATE THROUGH THE FILM

EFFECTIVE & REGENERATIVE CLEANING OF THE CONTACT SURFACE



SHORT PATH THIN FILM EVAPORATOR WITH VACUUM DEHYDRATOR/DEGASSIFIER

EVAPORATOR TYPE SPTFE-80 TWO STAGE WITH DEHYDRATOR/DEGASSIFIER	
EVAPORATOR AREA	1.6 M2
CONDENSOR AREA	2.4 M2
VACUUM	
ATMOSPHERIC	
HEATER POWER	76 KW
INPUT CAPACITY	160 -225LPH
WATER CIRCULATION AT WATER	
TEMPERATURE 15 ^C	600 LPH
LEAKRATE TESTED	
POSITIVE PRESSURE	4 KG/CM2
NEGATIVE PRESSURE	
LEAKRATE FOR EMPTY DRY	
CHAMBER	1.2 TORR /HR
DIMENTIONS IN MM	
L X B X H	4400 X 1000X 3000
WEIGHT IN KG	3000

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MATERIAL BALANCE

THE MATERIAL BALANCE OF THE REREFINING UNIT DEPENDS FROM WASTE/USED OIL COMPOSITION.

FEED STOCK	TONS/YEAR
USED OIL	2000
PRODUCTS	
WATER & VOLATILES	100
LIGHT OIL	304
BASE OIL	1496
RESIDUE	100
UTILITIES	
ELECTRICAL POWER,Kwh	92
COOLING WATER ,M3	6
CHEMICAL FOR WASTE WATER TREATMENT	0.72
ACTIVATED ALUMINA/CARBON	3

SHORT PATH THIN EVAPORATOR WITH DEHYDRATOR/ DEGASSIFIER.