



**HYDROILTEK  
SYSTEMS**

*Pursuit of Perfection*

# HYDROILTEK SYSTEMS OVERVIEW PRESENTATION

Dated : March 2021

# Organization : HYDROILTEK SYSTEMS

**HYDROILTEK SYSTEMS** is a Kolkata based company engaged in the manufacturing of oil filtration equipment.

The first operation of building these equipment started at Surat in Gujarat under the name of WELTECH Enterprise in the year 2015.

The founders of **HYDROILTEK SYSTEMS** with graduation in Mechanical Engineering , have more than 25 years of work experience in Operations , Sales & Marketing of Industrial Products and Service Department of renowned organisation in India & overseas.

**We also provide Oil Purification and Dehydration Services at Customer's premises for**

- Hydraulic Oils
- Gear Oils
- Turbine Oils
- Compressor Oils

# Foot Print : Domestic Market



Current Plant Location



Proposed Additional Plants Location



Engineering , Development & Testing Location

# Some of Our Esteemed Customers ( majorly in the State of Gujarat )



**AM/NS  
INDIA**



**WELSPUN**





# Main Industry Segment

**Steel**



**Power**



**Heavy Engineering**



**Industrial Gear Box**



**Pulp & Paper**



**Foundries**



**Forgings**

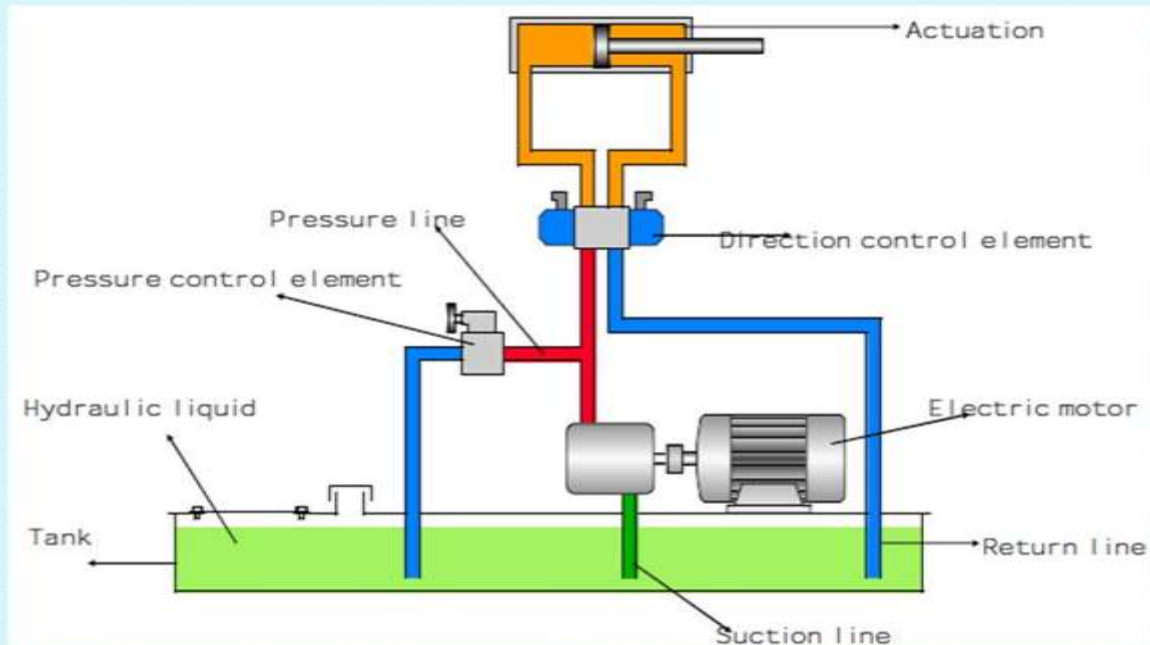


**Metal Cutting MCs**



# Hydraulic System : Its Component

## Components of a hydraulic system



34

Consisting of :

- ❖ Positive displacement pump driven by an electric motor
- ❖ The Pump pumps hydraulic fluid from the reservoir to the actuator through a pressure control and direction control valve.
- ❖ The actuator is a hydraulic cylinder whose movement is controlled by the hydraulic fluid.
- ❖ The flow , pressure and direction of the hydraulic fluid is governed by the various valves which are operated as per the system requirements by the control system of the machine.

**While the Oil moves in the system passing through different components it gathers contaminants**

# How Oil gathers Contaminants : Primarily 6 Ways

## ❖ Built-in Contamination :

All new equipment and components (e.g., final drive motors, pumps, etc.) are going to have some built-in contamination. Built-in contamination is contamination that is left-over from the manufacturing and/or assembly process. Like :

Tiny grains of sand left over from sand casting , A sliver of metal from a drilling/tapping operation , A piece a thread from a rag used to wipe down a part before installation , A glob of grease , A small chunk of welding slag

**Remedy :** Flushing the hydraulic system when installing new components or when a machine has recently undergone an overhaul. Aside from flushing the system, filtration system with filters & replacing filters are the best way to keep built-in contamination under control while maintaining the required NAS

## ❖ Generated Contamination

As your hydraulic equipment runs, it will generate contamination. Generated contamination includes very fine metal particles that look like dust. These particles result from metal-to-metal contact .

Generated contamination could also include particles of rubber or polymer seals that are wearing out.

Over time, generated contamination will affect the efficiency and productivity of your hydraulic components. And every bit of generated contamination is likely to produce even more contamination in a dangerous domino effect.

**Remedy :** This type of contamination is unavoidable but can be kept under control by the use of filtration system with filters & replacing filters maintaining the required NAS.

# How Oil gathers Contaminants : Primarily 6 Ways

## ❖ Air :

Air is not good for hydraulic oil. If air gets trapped in hydraulic fluid, it will affect its compressibility. Enough air contamination can affect the efficiency of machine, including the torque from your final drive and the cycle time for your attachments.

The key to minimizing air contamination is simple: don't unnecessarily expose your hydraulic system to air, and don't leave your hydraulic fluid storage containers open unnecessarily.

**Remedy** : The key to minimizing air contamination is simple: don't unnecessarily expose your hydraulic system to air, and don't leave your hydraulic fluid storage containers open unnecessarily.

## ❖ Water

Water poses problem for hydraulic oil. It affects compressibility and causes corrosion issues. It also impairs the ability of the hydraulic fluid to act as a lubricant and lead to the formation of sludge. Water-contaminated hydraulic fluid can also lead to cavitation in the pump ;we know how expense pump repairs and replacements can be.

If your fluid looks milky, then it is probably contaminated with water

**Remedy** : To use Vacuum Dehydrating System for taking our water from the Oil per PPM requirement to reuse it.





# How Oil gathers Contaminants : Primarily 6 Ways

## ❖ Chemical Contamination :

One of the primary causes of chemical contamination is the natural degradation of the hydraulic fluid. Over time, the chemicals that make up the fluid break down into components, and those components aren't always good for your system. Excessive heat can speed up this process.

**Remedy** : hydraulic fluid has a finite useful life and will degrade with both time and age. Change it out according to manufacturer guidelines.

## ❖ Ingressed Particulate Contamination

Ingressed contamination can include dust, mud, dirt, and sand, made their way into your hydraulic system from the outside.

It usually gets inside your hydraulic system when it is opened for repair or maintenance or through leaking seals.

**Remedy** : Using of Filtration System having Filters and replacing the filters per the oil specification requirement with respect to NAS / ppm



# Failure of System Components Due to the Contaminants in Oil

70-80% hydraulic component wear can be traced to solid particle contamination. The rest is caused by additive depletion and water.

The effects seen are

- ❖ **WEAR OF PUMPS:** The pump will no longer be able to produce the required flow and pressure causing sluggish movement of the cylinder, longer cycle time and insufficient force
- ❖ **WEAR OF CYLINDER RODS:** The seals will start leaking
- ❖ **WEAR OF VALVE PARTS AND STICKING OF VALVES:** Will lead to erratic cylinder operations
- ❖ **EROSION OF METERING ORIFICES:** Will affect the oil flow leading to erratic actuator performance.
- ❖ **OXIDATION:** Contamination specially in the range of 5 to 15 microns will act as catalysts in the process of the oxidation of oil. A highly contaminated oil will oxidise fast and be depleted of additives causing more wear and tear .

# Failure of System Components Due to the Contaminants in Oil

## Wearing of the components



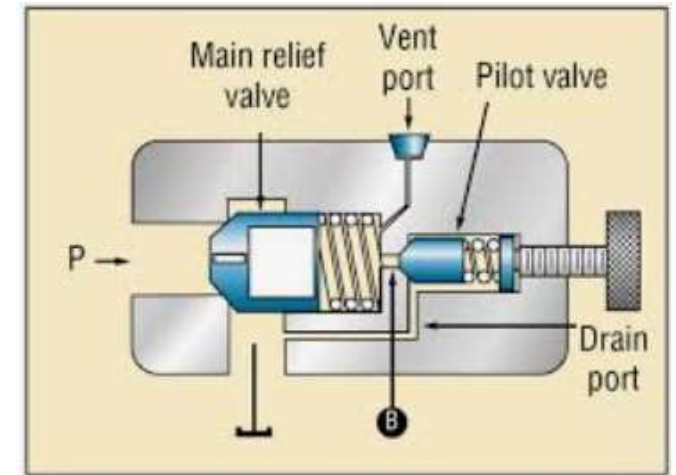
Wearing of the Component  
due to Contamination in Oil

## Leaking of seals



Leaking due to Seals which has  
Failed due to Contaminants

## Blocking of Valve Passages



Highly Precision Pressure  
Control Valves

# Failure of System Components Due to the Contaminants in Oil

## SOURCES OF WATER CONTAMINATION:

Water contamination in oil can occur due to the following reasons

- Through the breather
- Leakage of heat exchanger
- Through the cylinders
- Improper handling of oil drums during storage.

Oil becomes cloudy when it is contaminated with water above its saturation level.

The saturation level is the amount of water that can dissolve in the oil's molecular chemistry and is typically 200-300 ppm at 28 deg C for mineral hydraulic oil.

Above this the oil starts becoming cloudy due to formation of emulsion.

Further ingress of oil will lead to a separation of the phases producing an layer of free water and emulsified oil.





# Failure of System Components Due to the Contaminants in Oil

## EFFECTS OF WATER CONTAMINATION

- Causes viscosity change leading to loss of film strength
- Causes hydraulic pump cavitation
- Speedens up the oxidation rate ten fold
- Acidic products are produced by oxidation which cause corrosive wear of the bearings and seals leading to bearing damage and seal leaks.



*Water related  
bearing damage*

Under certain conditions, water molecules can be ripped up into their constituent oxygen and hydrogen atoms as a result of the high pressures generated in the load zone of a rolling element bearing.

Due to their relatively small size, the hydrogen ions produced by this process can absorb onto the surface of the bearing raceway resulting in a phenomenon known as hydrogen embrittlement.

# Understanding of NAS : Measuring Solid Contamination

There are 2 standards which measure contamination in oil.

## ❖ NAS 1638 STANDARD

- National Aerospace standard (NAS) is a voluntary standard developed by the Aerospace industry and covers a variety of subject areas
- NAS 1638 was developed to control and measure the contamination in hydraulic and lubricating oils.
- NAS 1638 represents the counts of particles in 5 groups
  - 5-15 microns per 100 ml
  - 15-21 microns per 100 ml
  - 21-50 microns per 100 ml
  - 50 -1 00 microns per 100 ml
  - above 100 microns per 100 ml.

Class	Maximum Particles/100mL in Specified Size Range (µm)				
	5-15	15-25	25-50	50-100	>100
00	125	22	4	1	0
0	250	44	8	2	0
1	500	89	16	3	1
2	1,000	178	32	6	1
3	2,000	356	63	11	2
4	4,000	712	126	22	4
5	8,000	1,425	253	45	8
6	16,000	2,850	506	90	16
7	32,000	5,700	1,012	180	32
8	64,000	11,400	2,025	360	64
9	128,000	22,800	4,050	720	128
10	256,000	45,600	8,100	1,440	256
11	512,000	91,200	16,200	2,880	512
12	1,024,000	182,400	32,400	5,760	1,024

# Understanding of ISO CODE 4406 : Measuring Solid Contamination

## ❖ ISO CODE 4406

Indian Standards Organization has prepared a code for oil cleanliness and this is being widely used nowadays. This represents the counts of particles in 3 groups

- 4 microns per ml
- 6 microns per ml
- 14 microns per ml

This method reports particle counts in three code numbers with each number correlating to the count of particles larger than 4, 6 and 14 microns.

ISO 4406 Cleanliness Code		
ISO Code Number	No of Particles per ml	
	More Than	Up to and including
24	80 000	160 000
23	40 000	80 000
22	20 000	40 000
21	10 000	20 000
20	5 000	10 000
19	2 500	5 000
18	1 300	2 500
17	640	1 300
16	320	640
15	160	320
14	80	160
13	40	80
12	20	40
11	10	20
10	5	10
9	2.5	5
8	1.3	2.5
7	0.64	1.3
6	0.32	0.64

# Need of Filtration Equipment & Objective

## Objective :

- ❖ Ensuring Cleanliness Level of Hydraulic Oil per requisite specification
- ❖ Lubricating Fluid with moisture content less than 500 ppm / specification

## Insights:

- The Filters provided in the High Pressure and Return lines are not sufficient to keep the Oil Contamination level in the required limits of NAS 7 / below .
- The Oil reservoir over a period of time has accumulated contaminants also from environment
- Offline Filtration System , also called KIDNEY LOOP Filtration Systems are used; consisting of Pump , Motor & a Filter which forms the basic configuration as Independent Unit.
- A portion of Oil is sucked from the reservoir , filtered and returned to the reservoir
- KIDNEY LOOP Filtration Systems is not exposed to the Hydraulic System and all possible pressure variations, hence it is very efficient in removing Contaminations from fluid and holding without releasing it back to the fluid.
- The Offline System can operate 24x7 even when the Hydraulic or Oil Circulation System is not working . This remains as the Major Advantage of this system : Electrostatic System & Depth Filter System



# Equipment to Control Contaminants /Moisture & Capable to measure NAS/ppm on LIVE Basis

## Electrostatic Hydraulic Oil Cleaner

Suspended impurities are separated from the fluid getting super clean fluid

Below NAS 7



Removal of contamination from Hydraulic, Turbine, Compressor and Gear Oils

**ELECTROKLEEN**

## Low Vacuum Dehydrator

Guaranteed water reduction below 200 ppm



Removal of moisture from Oils

**NEEROKLEEN**

## Hydraulic Oil Depth Filter

Fast cleaning  
80% of contaminants are removed in a single pass  
UP to NAS 8



Removal of moisture and contamination from oil.

**MECHKLEEN**

For getting **Optimum Performance** from Equipment , Oil Hygiene is Very Important is Very Important and Industries are taking different Measure to ensure **OIL IS CLEAN, DRY AND COOL.**

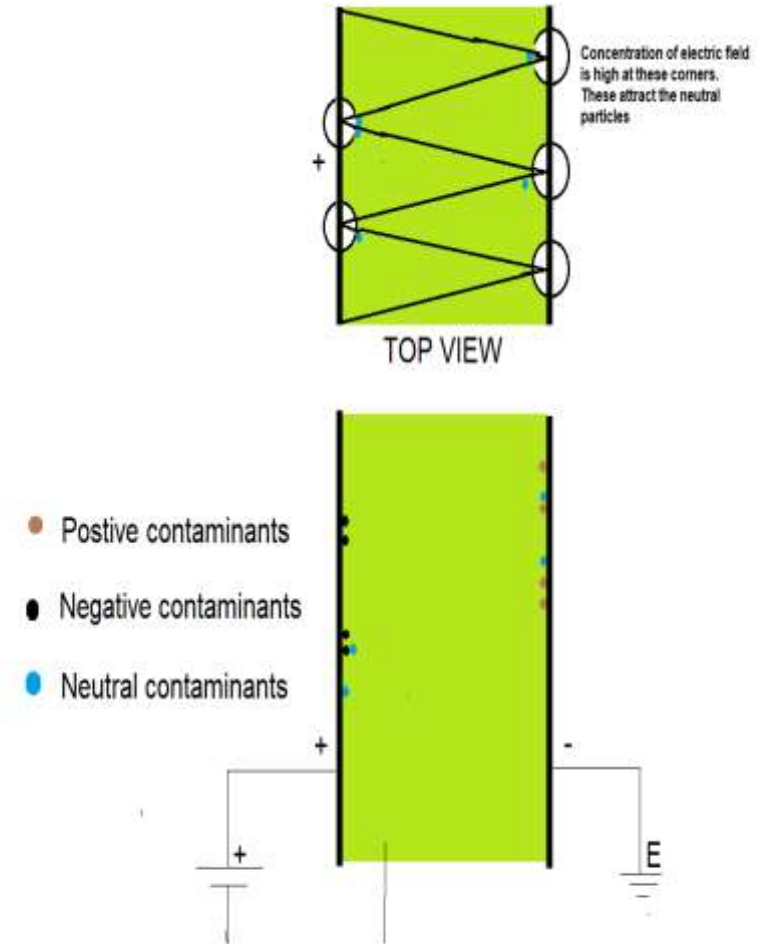
Electrostatic Oil Cleaning  
Equipment :

**ELECTROKLEEN**

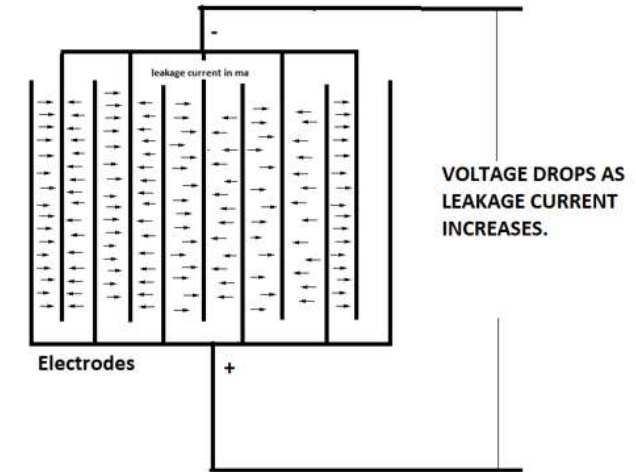
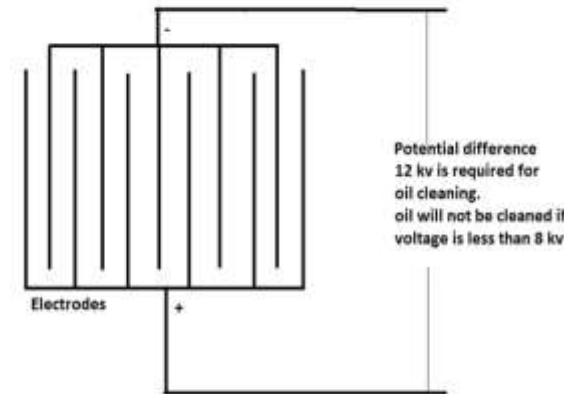
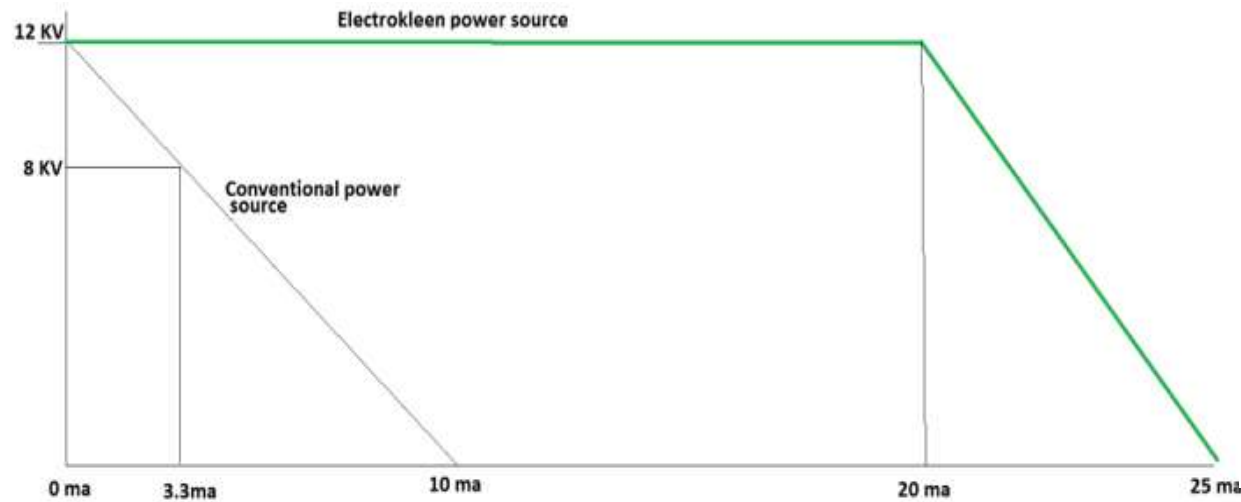


# Electrostatic Oil Cleaner : Working Principle

- The Electric Field is created between two electrodes .
- Oil is passed between a set of electrodes between which a potential difference of 8 to 12 KV is created.
- Contaminants are attracted to the electrodes and stick to the special cellulosic papers ( called collectors) placed over and between the electrodes.
- The result is an extremely clean oil and the clean oil is also able to flush out sticky sludge from the system
- Electrostatic Oil Cleaner has no influence on the additives of the oil.



# Concerns Addressed in ELECTROKLEEN



## Conventional Power Source

The voltage drops with an increase in leakage current (caused due to moisture ingress and presence of conductive contaminants in oil ) and becomes zero at 10 ma.


Efficiency of cleaning thus reduces with increase in leakage current. After the voltage drops below 8 KV (corresponding to a leakage current of 3.3 ma, cleaning does not take place through machine runs

## ELECTROKLEEN

The voltage remains constant at 12 KV even upto leakage current of 20 ma and oil is cleaned at the same efficiency



# OTHER FEATURES : ELECTROKLEEN



WELTECH  
ELECTROKLEEN 50

HYDROILTEK			FWD ON
ELECTROKLEEN 100			
0	KV	12.2	REV OFF
300	ma	0.5	
Running hours		0	HV ON
Cumulative hours		0	
STOP	REV	SETTINGS	

User friendly control panel

Oil leakage if any gets collected on the tray and machine stops when tray is filled.

WRONG PHASE CONNECTION  
OR ALL PHASE NOT EQUAL  
CHECK  
Direction of  
Pump Rotation

BACK

DRIP TRAY FULL. CHECK  
FOR OIL LEAKAGE  
Oil is not wasted

BACK

COLLECTOR WET. WARM THE  
COLLECTOR  
Avoiding wastage of  
Collector

BACK

CHECK CONDITION OF COLLECTOR  
AND CHANGE IF REQUIRED

BACK

EITHER TOP COVER OPEN  
OR LIMIT SWITCH FAULTY.  
Safety Feature

BACK

MOISTURE IN OIL  
Alarm Feature

RESET

BYPASS

Safety Feature

Alarm Feature



# Optional Features: ELECTROKLEEN

Optional

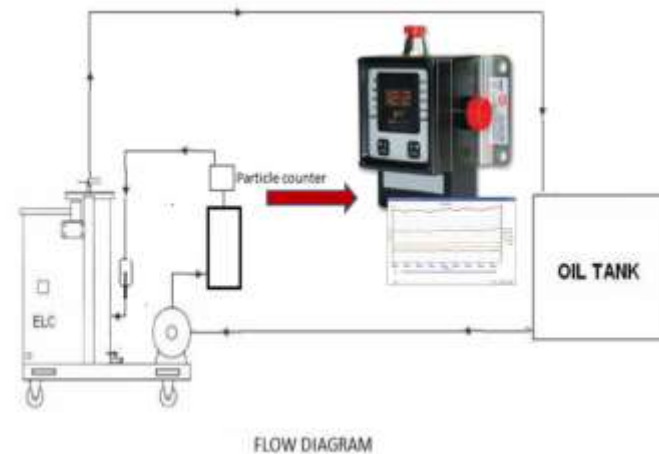
## 1. GSM Gateway / Wi-Fi enabled



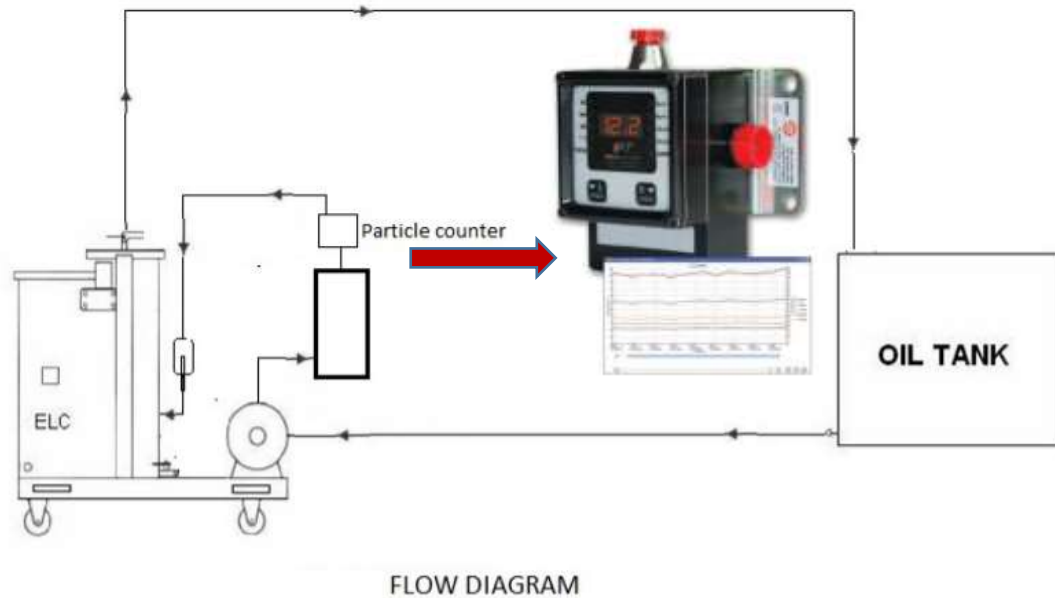
Communicating  
with Equipment



## 2. Particle Counter for LIVE reading



# Measuring of NAS / ISO on LIVE Basis



- ❖ Perfect for proactive maintenance and on-line monitoring
- ❖ Continuous particle counter with instant LED readout, computer interface
- ❖ Used as an alarm to notify you of any changes in contamination levels.
- ❖ Apparatus can plot ISO cleanliness trends ; utilizes the exact same laser particle counting technology found in more expensive laboratory particle counting equipment.

## **Benefit with respect to Early warning sign for:**

- Rise in contamination • Component wear • Filter and seal failure
- Water ingress • Oil oxidation • Cavitation

# Technical Specification for Electrostatic Oil Cleaner : ELECTROKLEEN

SPECIFICATIONS	ELECTROKLEEN 25	ELECTROKLEEN 50	ELECTROKLEEN 100
System flow rate	4 lpm	10-12 lpm	
Operating voltage	415 V 50 hz 3 Phase with neutral		
Control panel	4.3” Coloured touch screen-based HMI and I/O unit with 12 input and 10 outputs + 2 analogue inputs		
Rating	Continuous operation		
Power Source	300VA SMPS based Power Source with 220V input and 12 KV DC output.		
Oil inlet and outlet hoses	1 no. hydraulic hose with 3/8” BSP (F) end fittings and 1 nos. PVC hose with 3/8” BSP end fittings	1 no. hydraulic hose with 3/4” BSP (F) end fittings and 1 nos. PVC hose with 3/4” BSP end fittings	
Pump and motor	4 lpm PD pump with 0,25 HP 1440 rpm motor	10 lpm PD pump with 0.5 HP 1440 rpm motor	
Cleaning cell	25 litre tank tested for 3 bar operating pressure	50 litre tank tested for 3 bar operating pressure	100 litre tank tested for 3 bar operating pressure
Dimension(mm) (L x B x H)	770 x 480 x 525	800 x 515 x 715	1040 x 645 x 750
Approx. Weight	100 kg	150kg	200 kg





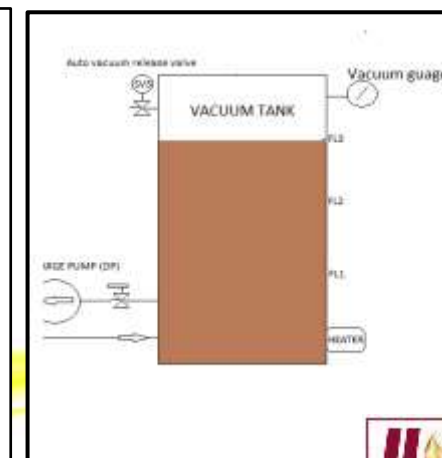
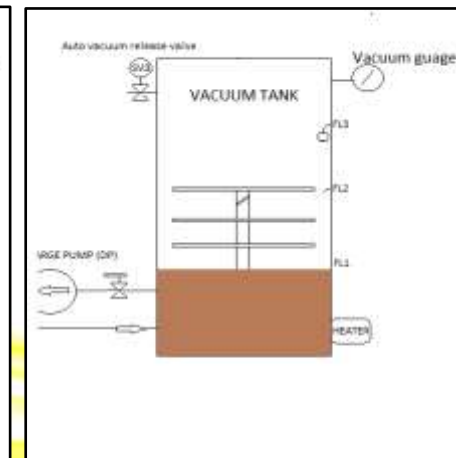
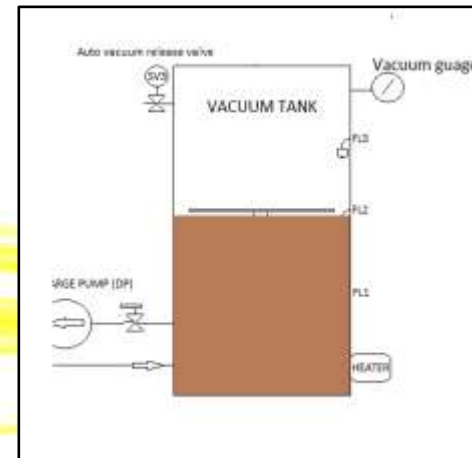
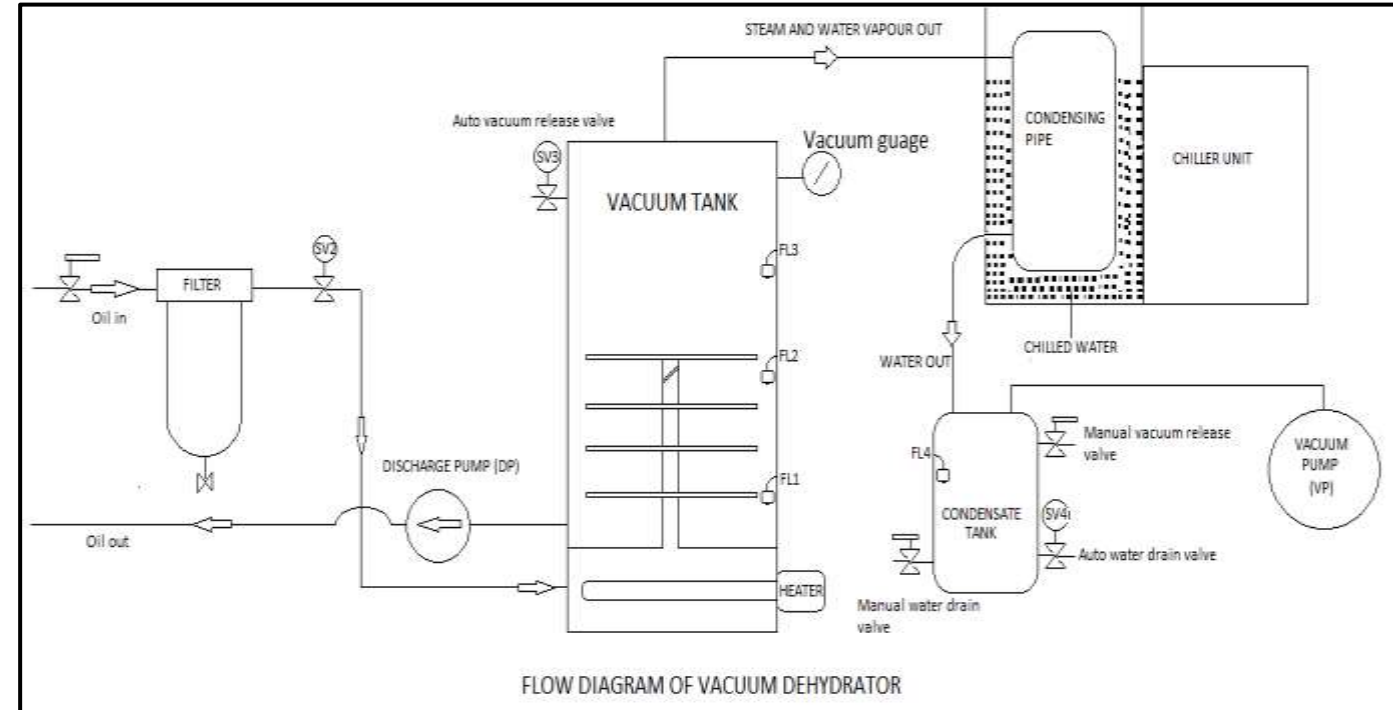
Vacuum Dehydrating - Moisture  
Removing Equipment

**NEEROKLEEN**



# Working Principle of Vacuum Dehydrator (LVDH)

- A Vacuum Dehydrator is used for removing moisture, water and dissolved gases from Oil
- It works on the Principle of Vaporisation of Water under Vacuum of 750 mm of Hg.
- Here water boils at 45-50 Deg. C. Hence preventing oil degradation due to temperature above 60 Deg. C
- When Oil reaches Level FL2, Discharge Pump Starts
- When Oil Level reaches FL1, Discharge Pump Stops
- If the Discharge Pump is defective and not able to discharge the Oil, Oil level reaches to Level FL3 and the Machine Trips



# Technical Aspects for Vacuum Dehydrator (LVDH)

- This technology is one of the most efficient and reliable ways to remove water contamination from the oil. It is more effective than Coalescer, water absorbing filter or solid liquid separator (Centrifuge).
- With the provided accessories it is able to reduce water contamination below 100 ppm.
- Phases of Water in Oil as shown \* :
- Moisture level above 500 ppm is very harmful to oil and the equipment. So it is necessary that moisture level is kept below 500 ppm.

*\* Phases of water in Oil \**



Free Water



Dissolved Water



Emulsified Water

# Technical Specification for Vacuum Dehydrator : NEEROKLEEN

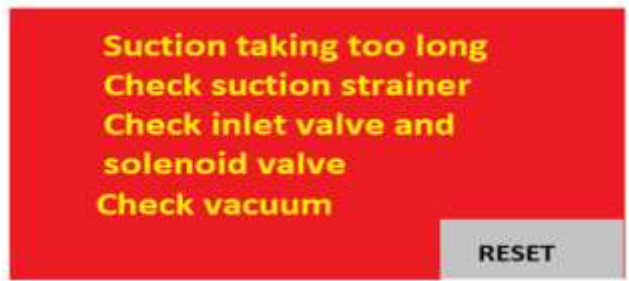
	VD - 50	VD - 100
Suitable for tank capacities	Up to 2500 lit	Up to 5000 lit
Oil inlet and outlet hoses		3/4" BSP
Vacuum Pump with motor (belt driven)	100 LPM, 0.5 Hp	200 LPM, 0.5 Hp
Vacuum Chamber	50 lit	100 lit
Operation Vacuum	750 mm of Hg	750 mm of Hg
Discharge Pump with motor	50 LPM, 2 Hp	50 LPM, 2 Hp
Low watt density Heater	6 KW	8 KW
Chiller Unit	0.6 TR	0.6 TR
HMI with touch screen display	4.3" PLC with 8 I/O	4.3" PLC with 8 I/O
Water discharge	Automatic	Automatic
Approximate weight	250 Kg	300 Kg





# Concern Addressed in NEEROKLEEN - Vacuum Dehydrator (LVDH)

- Monitors the Oil Level in the Vacuum Chamber
- Since the Suction is under Vacuum , the Discharge Pump does not Pump efficiently and after sometime the Machine Trips due to Oil Overflow ( FL3 Error)
- There is indicator to show that the Suction Strainer is choked . Because if the suction strainer is choked , oil does not enter the vacuum chamber and the machine continues to run without any result . The operator is able to know about the problem at a very later stage
- Suitable for Higher Viscosity of Oil VG320 and VG 460 with slight modification
- User friendly display unit



FL1	HYDROILTEK			SV2
FL2	Fill time	0 secs		SV3
FL3	Discharge time	0 secs		SV4
FL4	Oil temp	25 deg C		SETTINGS
	Set temp	55 deg C		
DP	Chiller temp	20 deg C		
SWITCH	Cycle	0		
	Running time	0 Hours		
STOP	VP ON	DP OFF	HTR OFF	Chiller off

LVDH started

FL1	HYDROILTEK			SV2
FL2	Fill time	0 secs		SV3
FL3	Discharge time	0 secs		SV4
FL4	Oil temp	25 deg C		SETTINGS
	Set temp	55 deg C		
DP	Chiller temp	20 deg C		
SWITCH	Cycle	0		
	Running time	0 Hours		
STOP	VP ON	DP OFF	HTR ON	Chiller off

Oil reached to the Level -1

FL1	HYDROILTEK			SV2
FL2	Fill time	0 secs		SV3
FL3	Discharge time	0 secs		SV4
FL4	Oil temp	25 deg C		SETTINGS
	Set temp	55 deg C		
DP	Chiller temp	20 deg C		
SWITCH	Cycle	0		
	Running time	0 Hours		
STOP	VP ON	DP ON	HTR ON	Chiller off

Oil Reached to Level-2 & Discharge Pump Started



Depth Filter Cleaning  
Equipment :

**MECHKLEEN**



# Technical Specification for DFT: MECHKLEEN

**Model 27x1**

**Model DFT 27x2**

## **TRANSFER PUMP**

Gear pump 10 LPM with 0.5 hp motor

Gear pump 10 LPM with 0.5HP motor

## **FILTER INSERTS:**

1 Nos. filter inserts each of size  
270mm x 270 mm.

2 Nos. filter inserts each of size  
270mm x 270mm

## **FILTRATION CAPACITY :**

BELOW 3 MICRON.

BELOW 3 MICRON

## **DIRT HOLDING CAPACITY :**

4 kgs

8 kgs

## **WATER HOLDING CAPACITY :**

2 litres.

4 litres



Note: Water holding capacity is 50% of dirt holding capacity . It means that if 2 litres of water is absorbed then only 4 kg of dirt can be absorbed. Similarly if 4 kg of dirt is absorbed then only 2 litres of water can be absorbed

# Technical Aspects for Depth Filter (DFT )Cleaner

This is a barrier filter system . Consists of special cellulosic filters which can absorb moisture and contaminants.

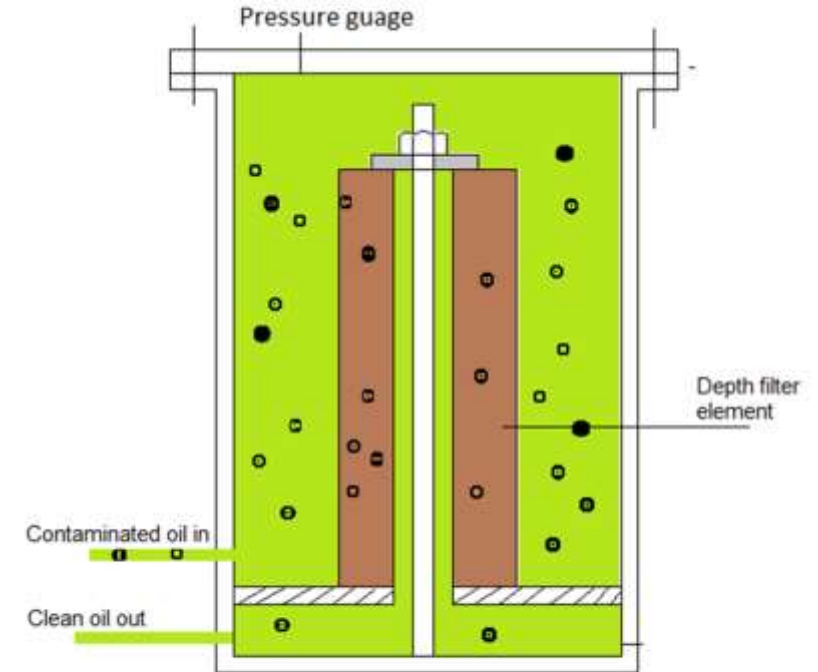
A single element can absorb upto 4 kg of contaminants of 2000 ml of water.

Around 80% contamination are removed in a single pass

Particles below 3 microns can be removed.

Can be used for filtration of the following oils

- ❖ Motor lubricating oils
- ❖ Hydraulic fluids
- ❖ Turbine lubricating oil
- ❖ Gear oils
- ❖ Honing oils
- ❖ Rolling oils





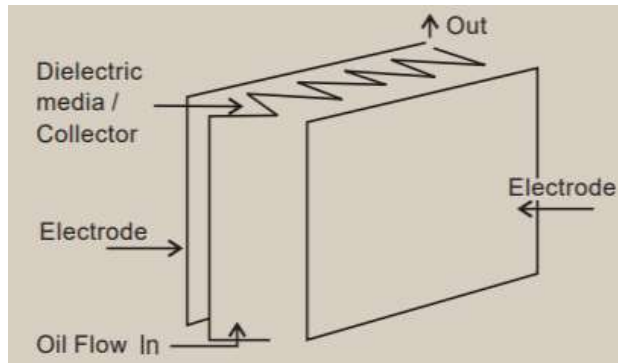
# Summary :

## Summary

### Electrostatic Hydraulic Oil Cleaner

#### ELECTROKLEEN

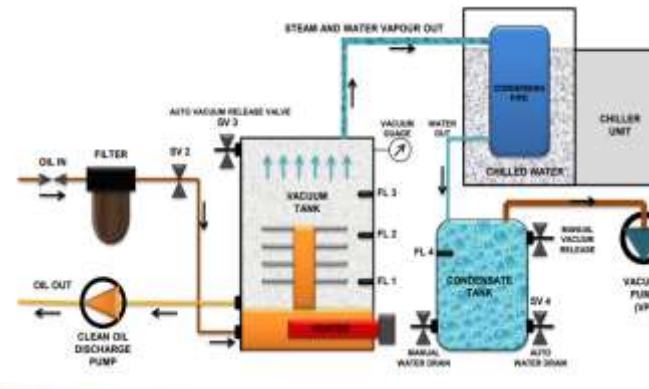
Suspended impurities are separated from the fluid getting **super clean fluid**  
**Below NAS 7**



### Low Vacuum Dehydrator

#### NEEROKLEEN

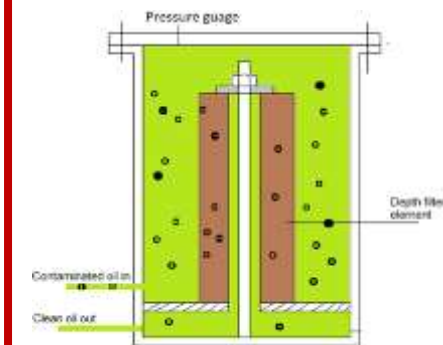
Guaranteed water reduction below 200 ppm



### Hydraulic Oil Depth Filter

#### MECHKLEEN

Fast cleaning  
80% of contaminants are removed in a single pass  
UP to NAS 8



The 2 Major Parameters of the Oil which are kept under Control are :

- ✓ **Contamination Level**: MEASURED in ISO AND NAS Acceptable level : Below NAS 7 or ISO 18/16/13
- ✓ **Moisture Level**: MEASURED in ppm (parts per million) Acceptable level : Below 500 ppm (0.05%)

# Thanks for this Opportunity to Serve



Contact us for more Information

## **HYDROILTEK SYSTEMS**

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