

## CUTTING FLUIDS

Metal Working Industry has made great strides in introducing new technology in recent years. HPCL's range of cutting fluids have kept up with the changes in technology by way of constant quality upgradation and development of new products to meet specific needs. HPCL's wide range of cutting fluids today cater to virtually every single application in the metal working industry. Classified as water mix type and straight type of cutting fluids, these products are marketed mainly under the brand names of KOOLKUT and TRIMOFIN, respectively. Special products are also sold for specific applications under different brand names.

### **WATER MIX TYPE OF CUTTING FLUIDS :**

HPCL's KOOLKUT series of water mix cutting fluids enjoy leadership status in the market. These products are formulated with refined base stocks and specially selected additives, raw materials, bactericides and other performance chemicals to ensure excellent performance in the shop floor. Diluted in water, at concentrations ranging between 2 to 10%, these products provide excellent cooling, mild lubricity, rust prevention and plating out characteristics.

**KOOLKUT 30** is a general purpose low cost emulsifiable type of cutting fluid suitable for all machining operations where emulsifiable oils are used. Depending on operating conditions oil concentration may be varied between 3 to 10%.

**KOOLKUT 40** is a premium quality emulsifiable cutting oil meeting BIS specification 1115 - 1986. It is recommended for all machining operations requiring emulsifiable fluids and offers excellent cooling and rust protection.

**KOOLKUT 60** is a special grade of premium quality soluble cutting oil. It is specifically recommended in applications where sight of the work piece is important as it forms a translucent emulsion. It is particularly recommended in very demanding applications involving very strict tolerance limits and surface finish. It meets BIS specification 1611-1980. Oil concentration may be varied between 3 to 10%.

**KOOLKUT EP 66** is a premium quality heavy duty soluble cutting oil possessing excellent Extreme Pressure properties. It is recommended in machining operations requiring soluble oils but where severity of machining is more.

It is much more effective in extending tool life when compared to other soluble cutting oils. Oil concentration may be varied between 5 to 10%.

PROPERTIES	KOOLKUT			
	30	40	60	EP 66
EMULSION TEST	OFF WHITE EMULSION	MILKY EMULSION	TRANSLUCENT EMULSION	SLIGHT YELLOW EMULSION
LOW TEMPERATURE STABILITY TEST	PASS	PASS	PASS	PASS
EP VALUE ( SHELL 4 BALL )				180

OK LOAD , KG				
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## SEMI SYNTHETIC FLUIDS

**KOOLKUT 70** is a synthetic fluid which contains no oil. It is supplied as a concentrate containing special corrosion protection additives dispersed in water. When diluted in water in 2-5% concentration, the solution obtained provides exceptional cooling and adequate rust prevention properties. KOOLKUT 70 is recommended for grinding and other high speed machining operations.

**SYNTHKOOL 100** is a premium quality semi-synthetic cutting fluid developed to combine the qualities of both oil based and synthetic water mix fluids. The product is formulated with an assortment of various components to provide cooling, antirust, lubricity, detergency and other properties. It is recommended for high precision grinding and other high speed machining applications. It is also recommended as a replacement to emulsifiable cutting oils in modern machinery.

ALL HP GRADES OF WATER MIX FLUIDS ARE FORTIFIED WITH SUITABLE BACTERICIDES. As such, all KOOLKUT grades and SYNTHKOOL 100 are exceptionally resistant to bacterial growth and provide long service. However, it is essential to maintain good plant handling practices as given below to obtain the longest possible life from these products :

- Pre-treatment of water and its softening for use emulsion/solution preparation.
- The product should always be added to water and not vice-versa. If water is added to product emulsification is not achieved fully and performance is poor, in addition to accelerated bacterial growth.
- Aeration of emulsion/solution to arrest the growth of the predominating anaerobic bacteria.
- Frequent removal of metal chips and fines with proper filtration.
- Regular cleaning of the Coolant reservoir and system.

CHARACTERSTICS	KOOLKUT 70	SYNTHKOOL 100
COLOR	FLOURESCENT GREENISH YELLOW	FLOURESCENT YELLOW
COPPER STRIP CORROSION 3 HRS, 100 ° C, MAX	1	1
NON VOLATILES WT % , MIN	35	38
pH OF 1 :50 SOLUTION IN DISTILLED WATER, MAX	9	8

## STRAIGHT CUTTING FLUIDS:

HPCL's range of straight cutting fluids covers all the available types as follows :

- Fatty Oil Compounded Type
- EP oils, non-staining type, with or without fatty oil compounding.
- EP oils, staining type with or without fatty oil compounding.

These products marketed mainly under the brand name TRIMOFIN are to be used as supplied without any dilution. To obtain optimum performance, the products are to be applied capiously to completely flood the worktool-chip area. By doing so adequate cooling can be provided to the operation, which otherwise is very easily achieved by water mix fluids.

TRIMOFIN grades are formulated from refined base stocks and sulphur based or chlorinated additives to achieve Extreme Pressure (EP) properties. Additionally or otherwise, they are compounded with high quality fatty oils to enhance wetting characteristics and to provide improved lubrication under boundary conditions.

#### **STRAIGHT CUTTING FLUIDS - COMPOUNDED TYPE :**

**TRIMOFIN 14** is a low viscosity oil compounded with high quality fatty oil. It is recommended in the machining of all non-ferrous metals (except titanium). Its low viscosity permits high speed machining. It is non-staining in nature. It is also recommended as a superfinishing/honing oil

**TRIMOFIN 15** is light colored oil with low viscosity , particularly suitable for honing operations, and is useful for machining all non- ferrous metals ( except titanium ) where a low viscosity is required. It has good heat transfer properties and therfore effectively cools the tool and work piece, under high speed conditions at which metals like aluminium, magnesium, zinc and their alloys are machined.

**TRIMOFIN 16 and TRIMOFIN 18** have a higher viscosity than TRIMOFIN 14/15 and have superior wetting characteristics. They are recommended for medium speed, severe machining of non-ferrous metals. TRIMOFIN 18 is a highly compounded oil and is therefore recommended for machining difficult non-ferrous metals such as non-leaded bronze and phosphor bronze. It is also useful as a drawing oil for ferrous and non ferrous metals. It is particularly recommended for drawing of non-ferrous rods and tubing. TRIMOFIN 18 meets BIS Specification 3065-1970 Type I, Grade II.

<b>PROPERTIES</b>	<b>TRIMOFIN</b>			
	<b>14</b>	<b>15</b>	<b>16</b>	<b>18</b>
VISCOSITY KINEMATIC CST @ 40 ° C	5	6	22	22
FLASH PONT COC, ° C	110	110	160	160
COPPER STRIP CORROSION , 3 HRS , MAX @ 100	1	1	1	1
SAPONIFICATION MATTER, WT %	8	8	9.5	20

#### **STRAIGHT CUTTING OILS (EP TYPE NON-STAINING)**

**TRIMOFIN 20** is a light coloured stable product of low viscosity, containing chlorinated EP additives. It is recommended for honing, lapping and other superfinishing operations of ferrous and non-ferrous metals involving high speeds.

**TRIMOFIN 21** is a low viscosity, light coloured product containing chlorinated EP and oiliness additives. Its is suitable for machining operation on mild steels, carbon steel, nickel steels and manganese steels and its use may be extended to copper, aluminum and their alloys if required. Trimofin 21 meets IS:3065-1985 Type-I, Grade II (re-affirmed I 1990) requirements.

**TRIMOFIN 23** is an oil of higher viscosity than TRIMOFIN 21. It is also compounded with a higher dosage of fatty oil. It also contains sulphurised EP additive. Due to its special formulation it has superior wettability. It is recommended for high-speed automatic machine tools and may also be used as a general purpose machine tool lubricant. TRIMOFIN 23 meets BIS Specification 3065-1970 Grade 2, Type 2 and also meets defence ZX-6 requirements.

**TRIMOFIN 25** is an oil similar to TRIMOFIN 23 but with a lower dosage of oiliness additive balanced by sulphurised EP additive. It is specially recommended for multispindle lathes where a number of operations such as turning, honing, chamfering etc. Are performed.

**TRIMOFIN 26** is a medium viscosity fatty oil compounded oil. Additionally it contains both chlorinated and sulphurised EP additives. It is suitable for most operations on medium machinability metals and even severe operations on steels. It is particularly recommended for grade rationalisation in cutting down usage of different grades and substitution by a single grade.

**TRIMOFIN 27** is a low viscosity oil compounded fatty oil. It also contains chlorinated and sulphurised EP additives. Due to its low viscosity it has excellent cooling and chip flushing performance. It finds use in gun drilling operations and has been found to be particularly useful in pull-honing operations. It is particularly recommended for grade rationalisation in cutting down usage of different grades and substitution by a single grade in operations requiring low viscosity oil.

PROPERTIES	TRIMOFIN					
	20	21	23	25	26	27
VISCOSITY KINEMATIC CST @ 40 ° C	5	25	33	35	29	13
FLASH PONT COC, ° C	110	160	160	160	160	145
INACTIVE SULFUR	NO	NO	YES	YES	YES	YES
ACTIVE SULFUR	NO	NO	NO	NO	NO	NO
CHLORINE	YES	YES	NO	NO	YES	YES
SAPONIFICATION MATTER, WT %	-	4.5	9	3	3.5	4.5

## **STRAIGHT CUTTING OILS (EP TYPE - STAINING)**

**TRIMOFIN 54** is a low viscosity fatty oil compounded product, which also contains active sulphur type of EP additive. It is specially recommended for deep hole drilling on ferrous metals and precision grinding of all types of steel. It is also used in other severe operations on ferrous metals requiring low viscosity oil. It is also recommended for thread rolling.

**TRIMOFIN 55** is a medium viscosity dark brown coloured fatty Oil compounded oil. It also contains active sulphur and chlorinated EP additives. It is recommended for severe machining operations on high tensile steel and for less severe operations on stainless steel and heat resistant alloys. It is particularly recommended for gear hobbing and threat cutting operations.

**TRIMOFIN 56** is a medium viscosity oil which is highly compounded with fatty oil. It contains a more potent additive package than TRIMOFIN 55 by way of active and inactive sulphur as well as chlorinated EP agents. It is specially recommended in threading, turning, broaching, trepanning and threat grinding operations where it gives excellent finish and improved tool life.

**TRIMOFIN 58** is a dark coloured medium viscosity oil containing a high dosage of Sulphur. It is recommended for heavy duty threading, tapping and broaching operation.

<b>PROPERTIES</b>	<b>TRIMOFIN</b>			
	<b>54</b>	<b>55</b>	<b>56</b>	<b>58</b>
VISCOSITY KINEMATIC CST @ 40 ° C	16	37	38	35
FLASH PONT COC, ° C	135	160	160	160
SAPONIFICATION MATTER, WT %	5	1.5	9	-
INACTIVE SULFUR	YES	NO	YES	NO
ACTIVE SULFUR	YES	YES	YES	YES
CHLORINE	NO	YES	YES	NO