INTER PLANT STANDARDIZATION – STEEL INDUSTRY		
IPSS	**CODE OF PRACTICE FOR USAGE OF LUBRICANTS IN STEEL PLANTS**	**IPSS:1-09-024-03**
	CORRESPONDING IS DOES NOT EXIST	

0. FOREWORD

0.1 This Inter Plant Standard has been prepared by the Standards Committee on Oils & Lubricants, IPSS 1:9 with the active participation of the representatives of the steel plants major consultancy organizations and established manufacturers of industrial lubricants and was adopted in November 2003.

0.2 Inter Plant Standards for steel industry primarily aim at achieving rationalization and unification of parts and assemblies used in steel plant equipment and accessories, and provide guidance in indenting stores or equipment (or while placing orders for additional requirements) by individual steel plants. For exercising effective control on inventories, it is advisable to select a fewer number of types from among those mentioned in this standard, for the purpose of company standards of individual steel plants. It is not desirable to make deviations in technical requirements.

0.3 Equipment employed in the steel industry often operates at high speeds and pressure, high and low temperatures, shock loading etc. Exposure to water and abrasive materials such as mill scale, ore fines and dirt are some of the adverse factors commonly encountered. Various types and sizes of motors, turbines, bearings, gears and drives are utilised. All of these factors make the lubrication of steel plant, a complex problem.

0.4 To organise lubrication of such a large fleet of equipment with all adverse operating conditions, it is essential to adopt standard practices to ensure proper lubrication.

0.5 To rationalise lubrication practices in steel plants, IPSS committee felt it necessary to develop this standard.

1. SCOPE

1.1 This code of practice provides guidelines for organising lubrication of steel plant equipment. EMM and Automotive equipment are beyond the scope of this standard since lubrication guidelines for such equipment are provided by the OEM's.

2. CODIFICATION OF LUBRICANTS

As a systematic approach towards the plant lubrication programme it is essential to codify the grades of lubricants used in the plant.

A numeric code shall be assigned to each type of lubricant for identification of category of lubricant.

Letter `*O*' shall prefix the numeric code of oils and
Letter `G' shall prefix the numeric code of grease

Letters A, B, C, D …… shall suffix the numeric codes for different viscosity grades / NLGI grades.

A hyphen (-) shall be used between the prefix and numeric code.

Example 1 : A numeric code assigned to Antiwear type Hydraulic oil is `6' and three different viscosity grades i.e. ISO VG 32, ISO VG 46 and ISO VG 68 are in use. The codification of grades shall be as follows :

GRADE CODE	LUBRICANT
0-6A	Antiwear Hydraulic oil ISO VG 32
0-6B	Antiwear Hydraulic oil ISO VG 46
0-6C	Antiwear Hydraulic oil ISO VG 68

Example 2 : A numeric code assigned to Lithium EP Grease is `1' and two different NLGI grades, NLGI-1 and NLGI-2 are in use. The codification of grades shall be as follows :

GRADE CODE	LUBRICANT
G-1A	Lithium EP Grease NLGI-1
G-1B	Lithium EP Grease NLGI-*2*

Model codification of commonly used grades in steel plants has been done in Appendix-A. This codification may be adopted directly or plants may codify lubricants as per their requirements on the basis of above guideline.

3. LUBRICATION SURVEY AND DOCUMENTATION :

The aim of conducting lubrication survey is to prepare a permanent document for lubrication of a particular equipment and to provide all necessary information to the user so that an organised lubrication programme may be carried out in an effective manner. Steps involved in lubrication survey are as follows :

3.1 Data Collection :

The usual source of information in collecting data is equipment supplier. Whenever catalogue / maintenance manual of the equipment is not available, assistance may be taken from history book of the equipment or any other previous record available. Following data shall be collected during the survey :

A. Individual Equipment :

i. Designation of the equipment
ii. No. of equipment installed
iii. Designation of each mechanism
iv. No. of such mechanisms in the equipment
v. Oil capacity of each mechanism
vi. *Grease* capacity of each mechanism
vii. Recommended lubricant
viii. Frequency of oil change

B. Centralised Oil Systems :

i. Tank capacity (volume) and dimensions
ii. Type, capacity and make of the pump with flow rate
iii. Type, capacity, make etc of heat exchanger
iv. Type, mesh/micron size, capacity, make and installed quantity of filters.
v. Maximum and minimum working levels of the system
vi. Rise in level of the system per barrel of oil
vii. Maximum and minimum working pressure of the system
viii. Recommended grade of lubricant with specifications
ix. Details of the equipment served by the system
x. Details of the interlocking scheme
xi. Details of centrifuge dedicated to the system
xii. Instrumentation details with max. and min. setting
xiii. Mode of operation (continuous / *intermittent*)
xiv. Distribution points and pressure settings.

C. Centralised Grease Systems :

i. Type of grease system (Star / loop)
ii. Type of grease system (Single, Duel & Multilines)
iii. Type and make of the pump
iv. Discharge of the pump
v. Tank capacity
vi. Grade of grease used
vii. Maximum and minimum operating pressure of the system
viii. Details of the reversing valve
ix. Details of the filters
x. Details of the dose feeders installed
xi. Operating and pause time of the system
xii. Number of points served by the system
xiii. Details of end pressure regulator
xiv. Mode of operation (Auto/Manual)
xv. Details of the equipment served by the system

3.2 Lubrication Charts :

Separate lubrication charts for individual equipment, centralised oil systems and centralised grease systems shall be developed based on the information collected as per para 3.1. formats for lubrication charts are given in Appendix-B, Appendix-C and Appendix-D for individual equipment, centralised oil systems and centralised grease systems respectively.

While compiling the charts, the most important activity is to recommend the brand of lubricants. The recommendations of OEM's regarding lubricants selection gets the first priority, hence while selecting an alternate brand, all the physico-chemical as well as functional parameters of the recommended lubricants shall be matched with available ones before recommending the same. In case of deviations, OEM may be contacted for confirmation. Past performance of any product/ brand and experience of sister plants shall be given due consideration. Necessary care shall be taken for recommending lubricants for equipment under warranty. During warranty period brand specified by the equipment manufacturer shall be recommended to avoid any legal complication during warranty period.

Efforts shall be made to minimise the number of grades. Past experience, discussions with equipment manufacturers, lubricant suppliers and sister plants shall help in minimising number of grades to a great extent.

Another important recommendation required to be given in lubrication chart is the frequency of oil change. For this purpose, the following guidelines shall be followed :

i) Periodic oil changing shall be done for equipment below 300 lts capacity. Frequency of oil change may be decided based on the recommendation of equipment manufacturer or as per the established norms fixed after periodic testing of in-service oil.

ii) For equipment above 300 lts capacity oil changing shall be done on condition basis.

iii) In centralised oil systems oil changing shall be done on condition basis.

The lubrication charts shall be developed by lubrication department in consultation with the user shop/department.

These charts shall form the reference document for lubrication of all equipment. All lubrication activities shall subsequently be planned on the basis of these charts.

3.3 Lubrication Schedules :

In order to implement the plant lubrication programme in an effective manner, all departments shall prepare lubrication schedules for their respective areas in consultation with lubrication department as listed. Following schedules shall be desireable :

i) Oil changing schedule
ii) Tank cleaning schedules for centralised systems
iii) Filter cleaning/ overhauling /*change* schedule
iv) Heat exchanger cleaning / overhauling schedule
v) Pressure tank / Accumulator cleaning schedule
vi) Manual greasing schedule
vii) Sampling schedule for centralised systems
viii) Inspection schedule

Lubrication department shall monitor the implementation of all lubrication schedules.

4. MAINTENANCE OF CENTRALISED SYSTEMS

4.1 **System *monitoring*** : Centralised lubrication systems shall be monitored on regular basis. Frequency of monitoring shall be decided by lubrication incharge of the respective area in consultation with lubrication department. A log-book shall be maintained for each system. Following parameters shall be recorded in the log-book.

Oil System :

i) System pressure
ii) Oil level in the tank
iii) Temperature of the oil in the tank
iv) Line oil temperature
v) Oil pressure before and after the filter
vi) Oil temperature before and after heat exchanger
vii) Water pressure before and after heat exchanger
viii) Working condition of signaling scheme
ix) Working condition of standby pump
x) Mechanical filter operation details
xi) Oil topping record
xii) Condition of centrifuge
xiii) The status of centrifuge-oil and water pre-heater
xiv) Status of tank oil heaters
xv) Audio / visual alarms
xvi) Protection devices – periodic checking & recording.

***Grease* System :**

i) Working pressure in both the lines
ii) Duration of operation
iii) Mode of operation (Auto / Manual)
iv) Operating condition of dose feeders
v) Reversing valve & EPR operation details
vi) Self recording pressure gauge operating condition
vii) Periodic cleaning of the filters.

4.2 **Inspection** : Periodic inspection shall be carried out on the basis of check points indicated in Appendix-E. Preferably, inspection shall be carried out jointly by representatives of shop mechanical, lubrication department, instrumentation and electrical group. Periodicity of inspection shall be decided on the basis of criticality of the system.

4.3 **Maintenance & Repairs** : Based on the inspection reports, defect list shall be prepared for every system. Rectification/repairs shall be planned as per the practices in vogue in each plant.

5. SAMPLING PROCEDURE

Analysis of oil-in-use is often carried out to ascertain the suitability of oil for further use. Sampling is the most critical activity in this exercise. Following procedure for sampling shall be followed :

5.1 **Sampling point** : Sample shall be taken from any accessible place where the oil is in circulation or agitation to the extent that it represents the problem or the system or both.

Some of the systems may have sampling points permanently installed. In such systems sample shall be taken from those points.

Take sample from petcock, installed in-line before the oil filter or from the oil reservoir, using the siphon tube, suction gun or thief tube.

5.2 **When to take sample** : Sample shall be drawn before topping up of oil, to know the extent of contamination / degradation during service. Further sample can be drawn, if required. Sample shall be taken during operation or immediately after shutdown when oil is at operating temperature.

5.3 **How to take sample** : Clean the area around sampling point to prevent contamination of the oil sample.

Discard the initial volume of oil from the sampling line to be sure the sample is representative.

Fill sample container about ¾ full to allow room for expansion.

5.4 **Sample quantity** : Take enough sample for the tests to be carried out. Laboratories cannot perform the necessary tests unless adequate amount of sample is available.

The following quantities are desirable :

i) Oils 1 litre
ii) Soluble oil emulsion 2 litres

5.5 **Container** : Use a new or extremely clean container. The ideal sample container shall be new, clean, transparent, odourless, chemically inert, unbreakable, light in weight and shall have tight closure. *Sealed containers shall be used for transportation of sample*.

5.6 **Identification** : *Label* the sample container with indelible ink. A tag wired to the sample is preferred to an adhesive type *label*. Be sure to record the following on sample container :

- Full brand name
- Department / plant's name
- Date of sampling
- Source of sample
- Date of last oil change
- Specific problem, if any.

5.7 **Additional information** : If the sample is required to be sent to external laboratory for any specific problem, the following information shall be provided in addition to the information given in para 5.6.

- Reason for sampling/Brief description of the problem
- Equipment identification and size
- Reservoir oil capacity and oil pump details
- Sampling point
- Topping up rate
- Operating temperature
- Type of filteration/purification
- Special conditions, if any.

6. *CRITERIA* FOR OIL *CHANGE* :

Oil loses some of its properties during use. Table-1 indicates the warning limits for lubricating oils in use for common steel plant applications.

Necessary decision for improving the oil condition or oil change may be taken on the basis of warning limits, past experience and OEM's */Oil companies'* recommendations.

7. OIL CHANGE PROCEDURE FOR LARGE CENTRALISED SYSTEMS :

There are wide variations in the design of different systems. It is, therefore, extremely difficult to prescribe a fixed detailed procedure. However, following general guide lines shall be followed :

7.1 **Removal of used oil** : The used oil charge shall be removed from the system as soon as possible after the system has been shut down. Draining shall be as complete as possible. Accessible pockets of oil remaining after removal of the used charge shall be cleaned out.

7.2 **Initial cleaning** : It is desirable to clean oil tanks manually, because they may contain considerable quantities of sludge. If the tanks are badly rusted, it may be necessary to chip and wire brush for removal of rust, subsequently wiping the surfaces by fine cloth. Other parts of the system shall be cleaned individually if required.

Cotton waste or other fibrous cloth shall not be used for cleaning the component of the oil system. Clean fine cloth of linen or cotton shall be used for cleaning purpose. Care shall be taken to avoid leaving threads in the system.

7.3 **System flushing** : If the deposits in the pipe lines and the system are too much and gummy in nature then it is desirable to carry out flushing of the system.
Careful selection of flushing oil is extremely important. Straight mineral oil of low viscosity shall be used for flushing purposes.

During flushing, oil shall be heated upto 60 deg. C. For this purpose it is necessary to fit temporary oil heating arrangements such as steam coils. Some system tanks are provided with steam coils at the tank bottom itself.

It is not possible to specify the quantity required precisely for the flushing operation. It varies according to the design of the installation.

Before starting the circulation it shall be ensured that the equipment are disconnected from the system and ends of the pipe lines are properly looped to make a close circuit. Cleaning of the equipment shall be carried out separately by dismantling the various components if required.

The flushing oil shall be circulated by means of the main pumps if they are independent of the equipment or by means of the auxiliary pumps or portable pumps.

Flushing medium will remove sludge from the surfaces of the system rapidly, but such matter tends to remain in suspension in the fluid. Further circulation of flushing medium is simply circulating sludge round the system. To arrest/remove the sludge, centrifuge shall be in operation during flushing and suitable filters shall be provided at return line to arrest the sludge. Filters shall be cleaned/changed during flushing if required.

In general the flushing shall be done for a period of 12 hours, but exact duration of flushing shall depend on the amount and nature of contaminants/deposits initially present in the system. The quantity of matter removed from the flushing charge by centrifuging or filtration shall diminish progressively until it is evident that the rate at which such matter is being taken into suspension has become low. This can be checked by inspecting filter elements and centrifuge bowl. When there is an indication that very little matter is being removed from the system, an inspection shall be made to check that the surfaces are clean. If surfaces are found satisfactory, the flushing operation can be terminated.

The complete removal of flushing charge is required before fresh oil is charged into the system. *Manual* cleaning shall be carried out after removing flushing medium from remotest corner of the system. *Manual* cleaning shall be done as specified in para *7.2*.

7.4 **Charging of fresh oil** : Before executing the charging of oil in the system batch number printed on the drum shall be recorded with quantity of each batch to be charged. If charging is done through bulk tank, a sample shall be drawn from the bulk tank. Cleanliness of the charging funnel may be ensured before charging the system with fresh oil. After completion of charging, a sample shall be drawn from the drain point of the system tank before putting the system in operation. These samples may be used as a reference sample for future monitoring of the system.

8. INTER MIXING THE DIFFERENT BRANDS OF LUBRICANTS

The oil is composed of base oil and additives which are chemicals. The additives are added to impart desirable properties in the oil and / or to suppress the undesirable ones. The additive composition of oil is the trade secret of oil supplier. Under the circumstances, if the additives (chemicals) react with each other and form antagonistic compound, the basic purpose of adding this gets defeated.

For these reasons brands of lubricants manufactured by different suppliers shall not be inter-mixed even though they are meeting the same specifications. If change of brand is essential for any reason, the entire oil shall *be* drained out from the system and new brand may be filled after flushing out the system.

Homogenity / *miscibility* tests carried out by certain laboratories shall not be used as a single *criteria* for inter-mixing the different brands because it does not give any idea *about* the performance of the mixture. Hence, some of the performance / functional tests may be carried out before taking any decision of intermixing and the system, where oil has been mixed, is to be kept under initial observation.

9. STORAGE, HANDLING AND RECLAMATION OF LUBRICANTS

Please refer IPSS:3-02-004-95.

10. CONSUMPTION CONTROL

Organised lubrication programme must address the problem of oil and grease consumption to avoid excessive usage, environmental pollution and unnecessary costs. Records of consumption trends may be indicators of problems such as failure of oil seals, large oil spills and mechanical problems etc.

Consumption reports and lubricant loss report are the major tools which shall be used for controlling the consumption. Model formats for consumption report and lubricant loss report are given in Appendix-F and Appendix-G respectively. Such reports shall be forwarded by all the departments to lubrication department. Lubrication department shall compile the data shop-wise and system-wise and excessive consumption areas shall be located. Further investigation shall suggest the exact reason for excessive consumption for which necessary corrective action shall be taken at an appropriate level.

Wherever available, comparative reports from similar plants are very helpful as plants with higher consumption and / or costs can usually benefit from ascertaining the reasons underlying the better performing plant's records.

Consumption indices / specific consumption is the best indicator of lubrication performance of a plant. However, manufacturing process, product mix, type of equipment etc has a great impact on the specific consumption. Comparison of specific consumption with similar plant is always beneficial. Calculation of specific consumption shall be done with the following formula:

$S = (Q_o \times 0.88 + Q_g) \div P$

Where :

S - Specific consumption in Kg of lubricants per Ton of Steel produced.

Q_o - Consumption of oil in litres

Q_g - Consumption of grease in Kg

P - Production of steel in Tons.

Note : Average specific gravity of lube oil shall be considered as 0.88 for converting volume to weight.

The specific consumption can be calculated for crude / saleable steel as per the requirement.

Note: The specific lubricant consumption of different plants are having different product mix, hence following shall be ensured :

a) Define the oil which are not considered as lubricant for the purpose of uniform calculation.
b) It is well known that the rolling mills for flat products consume large quantity of oil but the same is not reflected in the present system of reporting.
c) Specific consumption of plant with core units only cannot be compared with plants having service units / diversified units like coal chemicals.

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REFERENCES :

a) IS:12139-1987 “Code for lubrication symbol”

T A B L E - 1

WARNING LIMITS FOR LUBE OILS IN USE

PROPERTY	TYPE OF OIL / APPLICATION						
	Steam Turbine	**Circulat -ing Oils**	**Hydraulic Oils**	**Gear Oils**	**Compres -sor**	**Oil film bearing Oils**	
Viscosity change % (max.)	15	15	20	20	15	20	
Total Acid No. Max. increase Mg KOH/g	0.5	0.5	0.5	NA	1.0	0.5	
Water content % (max.)	0.1 after purification	0.1 after purification	0.1 after purification	0.1 after purification	-	0.1 after purification	
Calcium content Ppm (max.)	20	-	-	-	-	-	
Demulsibility P-91 IS:1448	To be tested for demulsibility 40-37-3(30 max) and reported for corrective action	-	40-37-3(30) (upto VG 68) 40-37-3(40) (VG 100 & VG 150)	-	-	To be tested for demulsibility 40-37-3(30) max (upto VG 320) 40-37-3 (50) max (beyond VG 320)	
Flash point, COC, C Lowering, C Max	-	-	-	-	25	-	
Foaming characteristics (stability volume in ml) after 10 minutes a) at 24^{o}C b) at 90^{o}C	10 2 reported for corrective action	-	-	-	-	-	

Necessary decision for improving the oil condition or oil change may be taken on the basis of warning limits, past experience and OEM's */Oil companies'* recommendations.

The above values are taken for guidance only. However, final decision woud be taken after mutually agreed upon.

APPENDIX – A

MODLE CODIFICATION OF STEEL PLANT LUBES

OILS :

SL NO.	GRADE CODE	LUBRICANT	SPECIFICATION
1.	0-1A	Spindle oil VG 5	IS 11696:86
2.	0-1B	Spindle oil VG 10	IS 11696:86
3.	0-2A	Turbine oil VG 32	IS 1012:87
4.	0-2B	Turbine oil VG 46	IS 1012:87
5.	0-2C	Turbine oil VG 57	IS 1012:87
6.	0-2D	Turbine oil VG 68	IS 1012:87
7.	0-2E	Turbine oil VG 76	IS 1012:87
8.	0-2F	Turbine oil EP Type VG 46	DIN 51515 Part-1
9.	0-3A	Oil film bearing oil VG 46	IPSS:1-09-001-97
10.	0-3B	Oil film bearing oil VG 100	IPSS:1-09-001-97
11.	0-3C	Oil film bearing oil VG 257	IPSS:1-09-001-97
12.	0-3D	Oil film bearing oil VG 460	IPSS:1-09-001-97
13.	0-3E	Oil film bearing oil EP VG 100	
14.	0-4A	General purpose machinery oil VG 32	IS 493:81 Part-1
15.	0-4B	General purpose machinery oil VG 46	IS 493:81 Part-1
16.	0-4C	General purpose machinery oil VG 68	IS 493:81 Part-1
17.	0-5A	EP type gear oil VG 68	IS 8406:93
18.	0-5B	EP type gear oil VG 150	IPSS:1-09-003-97
19.	0-5C	EP type gear oil VG 220	IPSS:1-09-003-97
20.	0-5D	EP type gear oil VG 257	IPSS:1-09-003-97
21.	0-5E	EP type gear oil VG 320	IPSS:1-09-003-97
22.	0-5F	EP type gear oil VG 460	IPSS:1-09-003-97
23.	0-5G	EP type gear oil VG 680	IPSS:1-09-003-97
24.	0-5H	EP type gear oil VG 1000	IPSS:1-09-003-97
25.	0-6A	Antiwear hydraulic oil VG 32	IS 10522:83
26.	0-6B	Antiwear hydraulic oil VG 46	IS 10522:83
27.	0-6C	Antiwear hydraulic oil VG 68	IS 10522:83
28.	0-6D	Antiwear hydraulic oil VG 100	IS 10522:83
29.	0-6E	Antiwear hydraulic oil VG 150	IS 10522:83
30.	0-6F	Antiwear hydraulic oil VG 220	
31.	0-7A	Hydraulic oil HLP VG 46	DIN 51524 Part-**I**
32.	0-7B	Hydraulic oil HLP VG 68	DIN 51524 Part-**I**

* VG 381, 320, 680, 521

SL NO.	GRADE CODE	LUBRICANT	SPECIFICATION
33.	0-8A	Compressor oil VG 100	IS 13256:92
34.	0-8B	Compressor oil VG 150	IS 13256:92
35.	0-8C	Compressor oil VG 220	IS 13256:92
36.	0-9A	Refrigeration oil VG 32	IS 4578:1997
37.	0-9B	Refrigeration oil VG 46	IS 4578:1997
38.	0-9C	Refrigeration oil VG 68	IS 4578:89
39.	0-13A	Soluble cutting oil	IS 1115:86 IS 3065:96
40.	0-13B	Neat cutting oil	

GREASES :

SL NO.	GRADE CODE	LUBRICANT	SPECIFICATION
1	G-1A	Lithium EP grease NLGI 1	IPSS:1-09-005-99

2	G-1B	Lithium EP grease NLGI 2	IPSS:1-09-005-86
3	G-2A	Multipurpose Lithium grease NLGI 2	IPSS:1-09-006-97
4	G-2B	Multipurpose Lithium grease NLGI 3	IPSS:1-09-006-97
5	G-3A	Non soap grease NLGI 1	IPSS:1-09-008-97
6	G-3B	Non soap grease NLGI 2	IPSS:1-09-008-97
5	G-4A	Calcium EP grease NLGI 2	IPSS:1-09-009-97
7	G-5A	Wire rope & open gear compound Gr.1	IS 9182:93 Part 1
8	G-5B	Wire rope & open gear compound Gr.2	IS 9182:93 Part 1
9	G-6A	Graphited grease Gr.3	IS 508:87
10	G-7A	Lithium complex grease NLGI 1	IPSS:1-09-02-99
11	G-7B	Lithium complex grease NLGI 2	IPSS:1-09-02-99
12	G-8A	Aluminium complex grease NLGI 2	

APPENDIX – B

LUBRICATION CHART FOR INDIVIDUAL EQUIPMENT

SHOP : SECTION :

SL NO.	EQUIPT/ MECHANISM	NO. OF EQPTS	NO. OF MECHANISM	CAP. OF EACH MECHANISM IN LTS.	CAP. OF ALL MECH ANISM IN LTS.	LUBRICANT RECOMMENDED		FREQUENCY OF OIL CHANGE (MONTHS)	ESTIMATED ANNUAL REQUIREMENT LTS / KG			ESTIMATED ANNUAL RECOVERABLE USED OIL IN LTS.	RE-MARK
						GRADE CODE	GRADE		FOR OIL CHANGE	FOR TOPPING UP	TOTAL		
1	2	3	4	5	6	7	8	9	10	11	12	13	14

APPENDIX – C

LUBRICATION CHART FOR CENTRALISED OIL SYSTEM

SHOP : SECTION :

SYSTEM NO.	RECOMMENDED GRADE OF OIL (WITH SPECIFICIATIONS AND GRADE CODE)	RISE IN LEVEL OF THE SYSTEM PER BARREL	WORKING LEVEL		WORKING PRESSURE		TANK		PUMP		HEAT EXCHANGER		FILTER		DETAILS OF INTERLOCKING SCHEME	DETAILS OF CENTRIFUGE	INSTRUMENTATIO DETAILS & SETTING
			MAX	MIN	MAX Kg/cm^2	MIN Kg/cm^2	CAPACITY LTS	DIMENSIONS (LXBXH)	TYPE/MAKE & No.	CAPACITY LITRES PER MINUTES (LPM)	TYPE/MAKE & No.	COOLING AREA M^2	TYPE/MAKE & No.	CAPACITY IN MICRONS			

APPENDIX – D

LUBRICATION CHART FOR CENTRALISED GREASE SYSTEM

SHOP : SECTION :

SYSTEM NO.	RECOMMENDED GRADE OF GREASE (WITH SPECIFI-CATIONS)	TYPE OF SYSTEM (STAR /LOOP)	TYPE & MAKE OF THE PUMP	PUMP DIS-CHARGE	TANK CAPA-CITY	OPERATING PRESSURE		REVERS-ING VALVE DETAILS	FILTER DETAILS	DETAILS OF DOSE FEEDERS INSTALLED	OPERATING & PAUSE TIME OF THE SYSTEM	NO. OF POINTS SERVED BY THE SYSTEM	END PRESSURE REGULATION (EPR) DETAILS	MODE OF OPERATION (AUTO/MANNUAL)	EQUIP SERV BY T SYST
						MAX	MIN								

APPENDIX – E

CHECK POINTS FOR INSPECTION

A. CHECK POINTS FOR CENTRALISED OIL SYSTEMS :

Tank :

a) Level *of* oil in the tank.
b) Condition of low level signal.
c) Condition of oil in the tank.
d) Temperature of oil in the tank.

Filters:

a) Pressure of oil before and after the filter.
b) Condition of drives for the filters (disc filters).
c) Condition of valves.

Pumps:

a) General condition of pumps.
b) Condition of couplings.
c) Condition of foundation bolts.
d) Condition of pressure regulating valves.
e) Condition of relief valve.
f) Oil pressure.
g) Condition of bearings.
h) Condition of packings/seals.
i) Condition of gearings.
j) Condition of non-return valves.
k) Auto working of the pumps.

Oil Cooler :

a) General condition of the coolers.
b) Oil pressure before entry.
c) Water pressure before and after the cooler.
d) Temperature of oil before and after the cooler.

Instrumentation :

a) Setting of contact manometer for low/high pressure.
b) Setting of contact manometer for reserve pump starting.
c) Condition of audio and visual signals for reserve pump starting, low pressure, high pressure, low level and high temperature.

d) Condition of audio and visual signals in the cellar, machine hall and pulpits.

Centrifuge :

a) General condition of centrifuge.
b) Condition of suction filters.
c) Condition of gears.
d) Condition of disc assembly.
e) Condition of oil seals.
f) Condition of heater.
g) Condition of thermostat relay.
h) Temperature of oil being centrifuged.
i) Condition of water separation.
j) Condition of impurities seperation.
k) Condition of couplings.

General :

a) Condition of fire fighting equipment.
b) Condition of pipe line and valves.
c) Condition of oil flow indicators.
d) System and line pressure.
e) Leakage position in the system.
f) Consumption of oil in the system.
g) Contamination position in the system.
h) Lighting of the oil cellar and lubrication tunnels.
i) Cleanliness of the oil cellar, charging room, equipment, tunnel etc.

B. CHECK POINTS FOR AUTO CENTRALISED GREASE SYSTEMS :

Operation :

a) Working of system in auto or manual.
b) Frequency of pump operation.
c) Condition of signalling scheme.
d) Time for system reversal.
e) Condition of grease dischage.
f) Condition of pressure building up.
g) Pressure setting at end pressure regulator.
h) System pressure at reversal.
i) Any abnormal high pressure for a short while at reversal.

General :

a) Cleanliness of the station.
b) Level of grease in the reservoir.
c) Condition of grease.
d) Condition of grease charging device.
e) Level of oil in the pump chamber and its condition.
f) Condition of charging filters and line filters.
g) Condition of pump operation.
h) Condition of pressure gauges at EPR and system.
i) Condition of couplings.
j) Condition of reversing valve.
k) Condition of limit switches at reservoir and EPR.
l) Condition of solenoids.
m) Condition of safety valves.
n) Condition of self recording pressure gauge.
o) Daily chart/graph changing of SRPG and clock working.
p) Ink filling of Self Recording Pressure Gauges (SRPG).
q) Preservation of charts/graphs.
r) Working of system to required frequency.
s) Points not getting grease and their location.
t) Condition of dose feeders.
u) Any grease leakage with details of the location identified.

APPENDIX – G

OIL LOSS REPORT

SHOP :

SECTION :

EQUIPMENT :

MECHANISM:

DATE OF OIL LOSS :

TIME & SHIFT :

EQUIPMENT DOWN TIME :

QUANTITY OF OIL LOST :

BRAND OF OIL :

CAPACITY OF MECHANISM :

BRIEF DESCRIPTION :
(Reason for oil loss)

REMEDIAL MEASURES TAKEN :

ANY OTHER INFORMATION :

APPENDIX – F

LUBRICANT CONSUMPTION REPORT

SHOP :
MONTH :

A. CENTRALISED SYSTEM

SYSTEM NO.	BRAND OF LUBRICANT	CAPACITY OF SYSTEM IN BARRELS	LEVEL AS ON 1ST DAY OF THE MONTH	LEVEL AS ON LASTDAY OF THE MONTH	DIFFERENCE IN LEVEL		TOPPING DURING THE MONTH IN BARRELS	NET CONSUMP-TION IN BARRELS	REMARKS
					IN MM	IN BARRELS			
1	2	3	4	5	6	7	8	9	10

B. GROUND EQUIPMENTS & CRANES

SL NO.	BRAND OF LUBRICANT	QUANTITY CONSUMED FOR OIL CHANGE (BARRELS)	QUANTITY CONSUMED FOR TOPPING UP (BARRELS)	NET CONSUMPTION (BARRELS)	REMARKS
1	2	3	4	5	6

C. STOCK STATEMENT

SL NO.	BRAND OF LUBRICANT	STOCK AS ON 1ST DAY OF THE MONTH (O.B) (BARRELS)	RECEIPT DURING THE MONTH (BARRELS)	CONSUMPTION DURING THE MONTH (BARRELS)	STOCK AS ON LAST DAY OF THE MONTH (C.B) REMARKS	REMARKS
1	2	3	4	5	6	7