

# PLANT ENGINEERING'S Interchangeable lubricants

Joseph L. Fossett, Senior Editor, Plant Engineering Magazine

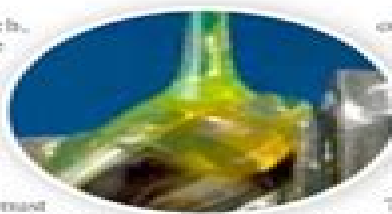
**W**hen, where, how much, and with what — these are the fundamental questions that have to be answered in equipment lubrication. The answers are normally provided by the builders of process and manufacturing equipment.

However, maintenance personnel must sometimes address the "with what" question when finding substitutes for previously used lubricants. This exclusive guide, published at 3-yr intervals, provides quick identification of major lubricant sources and cross referencing of products.

The ideal lubricant would last forever and retain all of its properties. In reality, leaks, evaporation, heat, oxidation, and contamination combine to limit its service life. Properly answering the "when" question requires monitoring, by means of oil analysis, which is a fundamental component of modern lubrication and preventive/predictive maintenance programs.

Regular laboratory analysis indicates the health of both lubricant and machine. Viscosity, contamination, oxidation, acidity, and metals content are examples of parameters analyzed.

The "where" and "how much" concerns are good candidates for the visual approach to total productive maintenance. For example, lube fittings, filler caps, oil cans, and grease guns can be color-coded for the type



of lubricant and the point of application. Captive plastic dirt caps for neck fittings are available in a variety of colors. Color-coding is often carried over to lube diagrams, which are laminated and attached to equipment or carried on lube routes.

## Using the guide

This exclusive guide presents products from 118 companies who responded to our request for information. Some chose not to respond and you will find them missing. Product names, listed in each category, were provided by the manufacturers.

Presenting the data does not reflect the quality of the lubricant, imply the performance expected under particular operating conditions, or serve as an endorsement. Lubricant and equipment manufacturers should be consulted for specific applications or questions.

## Viscosity a key factor

Viscosity is the property most widely accepted for identifying lubricants within a category. This characteristic serves as the basis for PLANT ENGINEERING magazine's product listings. Viscosity can be specified in several ways. The Viscosity/grade comparison chart compares commonly used systems. In this guide, lubricants within each category are arranged according to ISO viscosity grade, with the corresponding Saybolt viscosity shown for reference.

Viscosity/grade comparison chart

ISO viscosity grade	Kinematic viscosity Cst @ 40°C	Saybolt viscosity SUS @ 100°F	Gear lubricant specification	EP gear lubricant	Worm gear lubricant
2	1.98-2.42	32	-	-	-
3	2.69-3.52	36	-	-	-
5	4.14-5.56	46	-	-	-
7	5.12-7.48	50	-	-	-
10	9-11	68	-	-	-
15	13.5-16.5	75	-	-	-
22	19.8-24.2	100	-	-	-
32	28.8-35.2	150	-	-	-
46	41.4-50.6	215	AGMA 1	-	-
68	61.2-74.8	315	AGMA 2	EP 2	-
100	90-110	460	AGMA 3	EP 3	-
150	135-165	700	AGMA 4	EP 4	-
220	198-242	1000	AGMA 5	EP 5	-
320	288-352	1500	AGMA 6	EP 6	-
460	414-506	2150	AGMA 7	EP 7	Comp 7

Note: This guide covers only mineral oil-based products. A similar essential guide is published for synthetic lubricants (PE, July 2003, p. 46, PEI 0003). The guide is available on our web site at [plantengineering.com](http://plantengineering.com). Email the authors, and then submit the July 2003 issue.

# Plant Engineering Magazine Interchangeable Lubricants Guide

**Bella H. Chudnovsky**



## **Plant Engineering Magazine Interchangeable Lubricants Guide:**

**Interchangeable Industrial Lubricants**, 1989 Transmission, Distribution, and Renewable Energy Generation Power Equipment Bella H. Chudnovsky, 2017-03-07 The revised edition presents extends and updates a thorough analysis of the factors that cause and accelerate the aging of conductive and insulating materials of which transmission and distribution electrical apparatus is made New sections in the second edition summarize the issues of the aging reliability and safety of electrical apparatus as well as supporting equipment in the field of generating renewable energy solar wind tide and wave power When exposed to atmospheric corrosive gases and fluids contaminants high and low temperatures vibrations and other internal and external impacts these systems deteriorate eventually the ability of the apparatus to function properly is destroyed In the modern world of green energy the equipment providing clean electrical energy needs to be properly maintained in order to prevent premature failure The book s purpose is to help find the proper ways to slow down the aging of electrical apparatus improve its performance and extend the life of power generation transmission and distribution equipment

**Tribology** James M. Watterson, 2019-01-04 Tribology A Simple Guide to the Study of Friction addresses the types of seals and bearings that are commonly found in most rotating and moving machinery including how they are designed how they work and what can be done to ensure that they continue maintain proper lubrication and successful operation Tribology is the scientific and engineering study of friction and in common practice it most often involves the control and reduction of friction This is particularly critical to the successful and continued operation of moving parts This book addresses the types of seals and bearings that are commonly found in most rotating and moving machinery including how they are designed how they work and what can be done to ensure that they continue maintain proper lubrication and successful operation The author discusses the critical lubrication issues dealt with in gears and gear boxes focusing on specific types of mechanical seals including compression seals hydrodynamic seals hydrostatic seals and mechanical face seals Dr Watterson also introduces the reader to the major types of bearings including roller bearings ball bearings and various types of sealed bearing systems and their maintenance and lubrication requirements

**Electrical Power Transmission and Distribution** Bella H. Chudnovsky, 2012-11-16 Electrical distribution and transmission systems are complex combinations of various conductive and insulating materials When exposed to atmospheric corrosive gases contaminants extreme temperatures vibrations and other internal and external impacts these systems deteriorate and sooner or later their ability to function properly is destroyed Electrical Power Transmission and Distribution Aging and Life Extension Techniques offers practical guidance on ways to slow down the aging of these electrical systems improve their performance and extend their life Recognize the Signs of Aging in Equipment and Learn How to Slow It A reference manual for engineering maintenance and training personnel this book analyzes the factors that cause materials to deteriorate and explains what you can do to reduce the impact of these factors In one volume it brings together extensive information

previously scattered among manufacturers documentation journal papers conference proceedings and general books on plating lubrication insulation and other areas Shows you how to identify the signs of equipment aging Helps you understand the causes of equipment deterioration Suggests practical techniques for protecting electrical apparatus from deterioration and damage Supplies information that can be used to develop manuals on proper maintenance procedures and choice of materials Provides numerous examples from industry This book combines research and engineering material with maintenance recommendations given in layperson s terms making it useful for readers from a range of backgrounds In particular it is a valuable resource for personnel responsible for the utilization operation and maintenance of electrical transmission and distribution equipment at power plants and industrial facilities

**An Introduction to Groundwater Sources Operation and Maintenance** J. Paul Guyer, P.E., R.A.,2017-12-08 Introductory technical guidance for civil engineers and other professional engineers and facility managers interested in operation and maintenance of groundwater supply sources Here is what is discussed 1 OVERVIEW 2 REFERENCES 3 WATER SUPPLY HYDROLOGY 4 WATER USE 5 GROUNDWATER SUPPLIES 6 SURFACE WATER SUPPLIES 7 WATER QUALITY 8 APPLICABLE DOCUMENTS

**An Introduction to Domestic Water Treatment** J. Paul Guyer, P.E., R.A.,2018-01-31 Introductory technical guidance for civil and environmental engineers interested in domestic water treatment Here is what is discussed 1 OVERVIEW 2 REFERENCES 3 TREATING WATER AT THE SOURCE 4 UNIT TREATMENT PROCESSES 5 TASTE AND ODOR CONTROL 6 CONTROLLING ORGANIC CHEMICALS 7 TREATMENT PLANT INSTRUMENTATION AND CONTROL 8 CHEMICALS AND CHEMICAL APPLICATION 9 WATER TREATMENT PLANT RESIDUES 10 DESALINATION 11 WATER SAMPLING AND ANALYSIS 12 APPLICABLE PUBLICATIONS

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**An Introduction to Engineering of Water Supply Systems** J. Paul Guyer, P.E., R.A.,2021-04-23 Introductory technical guidance for civil engineers mechanical engineers environmental engineers and construction managers interested in planning design construction and operation of

water supply systems Here is what is discussed 1 DOMESTIC WATER DISTRIBUTION 2 DOMESTIC WATER TREATMENT 3 PUMPING STATIONS FOR WATER SUPPLY SYSTEMS 4 TREATED WATER STORAGE 5 WATER DESALINATION 6 WATER DISTRIBUTION IN COLD REGIONS 7 WATER DISTRIBUTION SYSTEM APPURTENANCES 8 WATER SAMPLING AND TESTING 9 WATER SUPPLY SOURCES 10 WATER SUPPLY SYSTEMS OPERATION AND MAINTENANCE 11 TREATMENT AND STORAGE IN COLD REGIONS 12 PUMPS OPERATION AND MAINTENANCE     An Introduction to Water System Pumps and Drivers J. Paul Guyer, P.E., R.A.,2018-01-22 Introductory technical guidance for mechanical and civil engineers interested in pumps and motors for water systems Here is what is discussed 1 OVERVIEW 2 REFERENCES 3 PUMPS 4 ACCESSORIES 5 APPLICABLE PUBLICATIONS     **Process and Chemical Engineering** ,1996     *Textile Technology Digest* ,2001     **Power Plant Engineering** ,1963     **Interchangeable Lubricants** ,1983     *Everyday Engineering Magazine* ,1917     An Index of U.S. Voluntary Engineering Standards United States. National Bureau of Standards,1971     **An Index of U.S. Voluntary Engineering Standards** William J. Slattery,1971     **Monthly Catalog of United States Government Publications** ,     *Monthly Catalog of United States Government Publications, Cumulative Index* United States. Superintendent of Documents,1976     **Compressed Air Magazine** ,1922

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dec 15 2022 this article will provide a brief overview of how to grow tomatoes for kids tomatoes are a member of the solanaceae family which also includes potatoes peppers and eggplants the plant is native to south america and was introduced to europe in the 16th century tomatoes are now grown in many parts of the world

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lycopersicon esculentum mill tomatoes whole halved vertically and halved horizontally the tomato təmərtou or təmə:tou is the edible berry of the plant solanum lycopersicum 1 2 commonly known as the tomato plant the species originated in western south america mexico and central america

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seed aimed at budding young gardeners as a delightful project in the spring or summer

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oct 16 2023 kids encyclopedia facts the tomato *solanum lycopersicum* is a botanical fruit but not a fruit as ordinary people use the word it is shiny and smooth it has many small seeds it is also very good for health most tomatoes are red the tomato is green when it is unripe

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the u s is second to china california and florida grow most commercial tomatoes here tomato juice is ohio s state drink in cold climates tomato plants in a garden die when the frost comes in warm places tomatoes can grow year round a huge tomato plant grows at disney world and sprawls over an area larger than an olympic size swimming

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tomato facts for kids name tomato tomatoes type of food fruit botanically produced from tomato plants total calories 22 medium tomato 123 grams total fat none medium tomato 123 grams total protein 1 gram medium tomato 123 grams total carbohydrates 5 grams medium tomato 123 grams 26 tomato facts for kids

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1 believe it or not tomatoes aren t always red they can be yellow pink purple black and even white 2 found at walt disney world resort florida usa the largest single tomato plant in the world covers an area of 56 73 metres sq that s bigger than an olympic size swimming pool 3 it s thought that tomatoes originally came from peru 4

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check the seed packet plant label or catalog information on the growth habit of a variety indeterminate tomato plants continue to grow taller and set fruits throughout the growing season stopping only when frost finishes them off many of the *bush tomato facts for kids* - Apr 07 2022

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tomatoes are the fruit of the tomato plant they originated in the south american andes around the area of modern day peru and was first used as a food by the aztec s in southern mexico because the tomato has seeds and grows from a flowering plant botanically it is classed as a fruit not a vegetable

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tomatoes are commonly called vegetables but they are actually fruits they are eaten raw or used in cooking canned tomatoes and tomato juice are also popular tomatoes are grown in all mild regions of the world they belong to the nightshade family tomato plants generally have many spreading branches the leaves are hairy and have a strong

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