



PAG Portfolio Integration

DISTRIBUTOR

Sales & Marketing Content

PAG CVP



Strong customer base in metals (US Steel, Nucor, Gerdau, ArcelorMittal, SSAB, SDI)



Strong offer to Power Gen (PAG Turbine fluids, top treat-Shell EcoSafe Revive)



Good reputation in industry for quality products and excellent customer service



Highly skilled technical Sales team (TKAMs) – 9 new TKAMs joined Shell



PAG and Glycol blending capabilities



Key relationships with industry leaders and influencers, customers and suppliers

METALS SECTOR



A range of FR Fluids to meet your needs

Water-glycol fluids for fire resistant applications in metals (hot rolling, diecasting, coke furnace), mining, Gen Man (fork lifts) and oil & gas applications - HFC

Shell Water-glycol S3 CX

- Excellent fire resistance
- Excellent anti-wear performance
- FM Global approved
- High pressure performance



Shell EcoSafe S3 DU

- Fire Resistance
- FM global approved
- Outstanding anti-wear performance



Specialty products - Application specific depending upon customer needs, other product technologies (HFA)

Shell Fire-Resistant Hydraulic Fluid HFA

- Excellent fire resistance
- Corrosion protection



Shell Water-glycol S2 C

- Excellent fire Resistance
- Good corrosion protection
- FM Global approved
- Anti-wear Performance



Shell Water-glycol S2 CX 46

- Excellent fire resistance
- FM Global approved
- High pressure performance



Shell EcoSafe S1

- Excellent anti-wear properties
- USDA certified biobased product
- FM Global approved



Shell Water-glycol Buffer

Shell Water-glycol Concentrate

INCREASINGLY EFFICIENT PROTECTION >>>>>

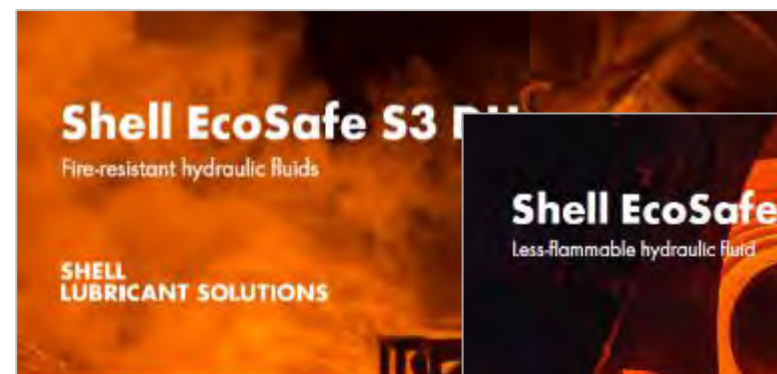
ADVANCED

MAINLINE

SELL SHEETS

2-pager sell sheets available to you:

- Shell EcoSafe S3 DU
- Shell EcoSafe S1 DU
- Shell EcoSafe Water-glycol S3 CX 46
- Shell EcoSafe Water-glycol S2 C
- Shell Fire-Resistant HFA
- Shell Gadus Steel Spindle Grease
- Shell Gadus S2 HD Coupling Grease
- Shell Gadus S3 U460 AC
- Shell Gadus S3 U220A



DESCRIPTION

Shell EcoSafe S3 DU, formerly EcoSafe TR, fluids are fully synthetic FM Approved industrial fluids. They can be used in industrial, high-pressure systems, systems with servo valves and oil robotics.

Shell EcoSafe S3 DU fluids are inherently fire-resistant, synthetic hydraulic fluids. Based on very high viscosity index polyalkylene glycol (PAG) base stocks coupled with a proven ashless additive package, Shell EcoSafe S3 DU fluids have been designed to minimize fluid degradation under even the most severe operating conditions. They deliver the performance properties demanded by today's high-performance hydraulic systems.

Shell EcoSafe S3 DU fluids have been developed to provide high resistance against varnish and sludge formation, thus ensuring long-term system cleanliness while extending maintenance intervals and service life. The fluids offer excellent lubricity for outstanding pump life under the most severe conditions and meet or exceed the pump performance of premium, outwear mineral oils at high operating pressures. Shell EcoSafe S3 DU will not break down and react with water, thus minimizing fluid degradation and the acid formation that can damage and eventually destroy hydraulic pumps.

A high viscosity index, in combination with excellent low-temperature fluidity, provides a year-round fluid that protects machines from corrosion during cold startups and provides durability at higher operating temperatures. All Shell EcoSafe S3 DU grades achieved a 13-stage rating in the FZG gear test, thereby demonstrating a high level of protection against wear and scuffing.

Although the Shell EcoSafe S3 DU range is compatible with many different types of fluids, to ensure proper system performance,

Detailed available

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DESCRIPTION

Shell EcoSafe S1 DU, formerly EcoSafe V, is a less-flammable hydraulic fluid designed for a readily biodegradable, low-toxicity hydraulic fluid. Recognized by FM (Flammable Industrial Fluid), it has a high flash point, fire point and autoignition temperature.

Hydraulic and fluid handling systems in exposed environments are subject to wide variations in temperature. The extremely high viscosity index of Shell EcoSafe S1 DU helps to deliver consistent performance from mild steel to full-load heavy-duty operations. Its high viscosity index and shear stability provide consistent viscosity where wide variations in ambient conditions are common.

Shell EcoSafe S1 DU is a U.S. Department of Agriculture (EPA) Certified Bio/Hermet product. It is readily biodegradable and can be used in environmentally sensitive areas applications in industrial and mobile applications, including high-pressure systems where fire hazards are concerns.

¹ Shell EcoSafe S1 DU is biodegradable by greater than 60% after 28 days in the OECD 308 Carbon dioxide evolution test.

Previous name	Product
EcoSafe V DU	Shell EcoSafe S1 DU S2
EcoSafe V DU	Shell EcoSafe S1 DU S3
EcoSafe V DU	Shell EcoSafe S1 DU S4

SPECIFICATIONS AND RECOMMENDATIONS

Shell EcoSafe S1 DU 46
Oil service has been
at USMA Central
Biodegradable
For a full listing of specific
recommendations, please
contact your local
Shell Lubricant Solutions Tech



DESCRIPTION

Shell Water-glycol S3 CX 46, formerly TRWG 46-HF, is a fire-resistant hydraulic fluid recognized by FM Global as a less-flammable industrial fluid.

Shell Water-glycol S3 CX 46 is suitable for use in high-pressure and high-speed hydraulic systems such as those in the casting equipment, welding machines, motion and handling devices, concrete cutters, hot strip mills, slag granulators and hot metal presses.

Recognized by FM Global as a less-flammable industrial fluid, Shell Water-glycol S3 CX 46 reduces fire hazards relating to personnel safety in storage, handling and use, which could help to lower insurance premiums. Formulated with 55-60% water and specially selected additives, it is completely soluble in water, which makes equipment and workshop cleaning easier than with conventional hydraulic fluids. Shell Water-glycol S3 CX 46 is also readily biodegradable.

Shell Water-glycol S3 CX 46 is suitable for applications of up to 350 bar (5,000 psi) and provides excellent antiwear protection for critical hydraulic components, pump parts and motor components. A high viscosity index and low pour point provide a wide temperature operating window, thereby enabling Shell Water-glycol S3 CX 46 to extend your round.

SPECIFICATIONS, APPROVALS AND RECOMMENDATIONS

Shell Water-glycol S3 CX 46 is
Classified as a less-flammable ind
For a full listing of specific
recommendations, please contact
your local Shell Lubricant Solutions Tech



DESCRIPTION

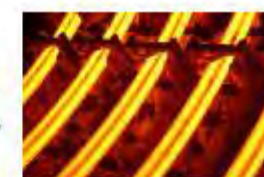
Shell Water-glycol S2 C, formerly FE-WG, is a fire-resistant hydraulic fluid and is recognized by FM Global as a less-flammable industrial fluid.

Shell Water-glycol S2 C was developed and designed specifically to operate at system pressures of 2,000 - 4,000 psi (138 - 276 bar) and to prevent the propagation of fire in the event of a hydraulic line rupture near ignition source, which makes it suitable for applications such as die casting equipment, welding machines, motion metal handling devices, concrete cutters, hot strip mills, slag granulators and hot metal presses. Recognized by FM Global as a less-flammable industrial fluid, Shell Water-glycol S2 C reduces the fire hazards relating to personnel safety in storage, handling and use, which could help to lower insurance premiums.

A high level of antiwear protection is built into Shell Water-glycol S2 C. It is designed to be released to mechanical shear, so it has a stable viscosity that helps to protect components against wear. In addition, it provides corrosion protection to a wide variety of metals, including aluminum, copper, brass, cast iron, steel and others commonly used in hydraulic circuits.

Shell Water-glycol S2 C 32 can be used in systems that contain a wide variety of seal, gasket and hose materials. That means it is suitable for use in many different types of equipment and is compatible with the fluid. Other materials such as Viton and Teflon are also compatible.

Previous name	Product
FE-WG 32	Shell Water-glycol S2 C 32
FE-WG 220-D	Shell Water-glycol S2 C 46



SPECIFICATIONS, APPROVALS AND RECOMMENDATIONS

Shell Water-glycol S2 C is recognized by FM Global as a less-flammable industrial fluid.
For a full listing of specific
recommendations, please contact your local
Shell Lubricant Solutions Tech



Resources available will be added to distributor flash drives, and ToolKit

FAMILY BROCHURES



Family brochures available to you:

- Shell PAG-based FR Hydraulic Fluids
- Shell Water-glycol Hydraulic Fluids

Conversion procedures available:

- Polyol Ester to Shell EcoSafe S3 DU
- Petroleum Oil to Shell Water-Glycol
- Phosphate Ester to Shell EcoSafe S3 DU
- AW Petroleum to Shell EcoSafe S3 DU



POWER SECTOR

A range of turbine oils to meet your needs

INCREASINGLY EFFICIENT PROTECTION >>>>>

ADVANCED

MAINLINE

Industrial steam, light- and heavy-duty gas, combined-cycle turbine systems, and turbocompressors

Shell Turbo *S4 X*

- Extended oil life
- Enhanced efficiency



Shell Turbo *T* Shell Turbo *J**

- Reliable Performance
- Reliable protection
- *Satisfies requirements of MHPS steam and gas turbines



Industrial steam, light- and heavy-duty gas and combined-cycle turbines, including geared turbines with load requirements

Shell Turbo *S4 GX*

- Extended oil life
- Enhanced wear protection



Low varnish **PAG-based solutions** for turbine and EHC systems

Shell EcoSafe Turbine Fluid *S5 X*

- Low varnish potential
- Extra oil life



Shell EcoSafe Turbine Fluid *S5 GX*

- Low varnish potential
- Extra oil life
- Enhanced wear protection



Shell EcoSafe *Revive*

- Solvency enhancer for varnish removal

Shell EcoSafe *EHC S3 DU*

- Fire-resistant
- Readily biodegradable
- FM Global approved



Shell EcoSafe *EHC Flushing Fluid*

Specialty products for EHC systems, or ammonia resistance

Shell Turbo *S5 DR*

- Excellent fire resistance
- FM Global approved
- Major OEM endorsement or approval



Shell Turbo *N*

- Excellent ammonia resistance



Shell
LubeAnalyst

- Shell EcoSafe EHC S3 DU
- Shell EcoSafe Revive
- Shell EcoSafe Turbine Fluid S5 X 25
- Shell EcoSafe Turbine Fluid S5 GX 25
- Shell EcoSafe Nuclear 46

Resources now available will be added to distributor flash drives, and ToolKit

CONVERSION PROCEDURES



CONVERSION PROCEDURE

Converting Turbines to Shell EcoSafe® Turbine Fluids (Formerly ACT TF Fluids)

This procedure describes the workflow to convert a conventional turbine oil (mineral oil) or PAO fluid system to Shell EcoSafe® Turbine Fluids. Thoroughness and preparation are prime considerations when changing fluids in any hydraulic system. Sufficient time, thought, and care can often mean the difference between successful operation or system issues. This procedure is based on common practice within the Shell technical service department and does not replace OEM instructions and/or procedures. Ideally, the working procedure will be custom made in close cooperation with the OEM service department, the equipment operator and Shell technical department. A general conversion procedure is provided below. Some variation to this procedure may be required depending on system and condition of the used fluid. Shell personnel should be consulted throughout this process.

Converting a turbine system to Shell EcoSafe® Turbine Fluids

1. Prior to the system conversion, check the compatibility/solubility of the turbine oil being replaced and Shell EcoSafe® Reviva.
2. While the turbine oil is at normal operational temperature, drain the minimum quantity of the current turbine oil and add the recommended amount of Shell EcoSafe® Reviva to the reservoir.
3. Submit a sample of the oil mixture should be submitted to the laboratory after 7 days and after 45 days of operation.
4. Operate the turbine as normal while monitoring temperatures, flow rates, and filter conditions to circulate the fluid. An increased use of filters may be observed.

When converting to Shell EcoSafe® Turbine Fluids:

5. Drain as much of the old turbine oil from the system as possible. Older used turbine oil will negatively affect the performance of the new turbine fluid.
6. Wipe down all surfaces in the reservoir with lint-free rags and remove any deposit material from the bottom of the oil reservoir.
7. Change the oil filters and inspect the oil cooler. Remove any deposit material found.
8. Charge the system with fresh Shell EcoSafe® Turbine Fluid and operate the turbine as normal for 3 - 7 days.

SHELL
LUBRICANT SOLUTIONS



CONVERSION PROCEDURE

Converting Electro-Hydraulic Control (EHC) Systems to Shell EcoSafe® EHC Fluids (Formerly ACT EcoSafe® EHC Fluids)

This procedure describes the workflow to convert a phosphate ester EHC fluid system to Shell EcoSafe® EHC Fluids. Thoroughness and preparation are prime considerations when changing fluids in any EHC system. Sufficient time, thought, and care can often mean the difference between successful operation or system issues. This procedure is based on common practice within the Shell technical service department and does not replace OEM instructions and/or procedures. Ideally, the working procedure will be custom made in close cooperation with the OEM service department, the equipment operator and Shell technical department. A general conversion procedure is provided below. Some variation to this procedure may be required depending on system and condition of the used fluid. Shell personnel should be consulted throughout this process.

Changing from Phosphate Ester Type Fluids to Shell EcoSafe® EHC

Studies have shown phosphate ester fluids and/or phosphate ester/petroleum oil blends to be completely compatible and miscible in Shell EcoSafe® EHC fluids. Although miscible, solids are known to form after high concentrations of phosphate ester and Shell EcoSafe® EHC fluid have been co-mingled for long periods of time. Thus, no more than 3% phosphate ester should remain in the system during long-term operation. Test samples should be pulled to confirm the phosphate ester content after conversion.

If a Tullers Earth or Solaxorb filter is used on the phosphate ester fluid for the control of the Total Acid Number (TAN), it should be voided-off and eventually removed from the system. This type of filtration is detrimental to Shell EcoSafe® EHC fluids because it removes performance additives without extending the expected life of the product.

1. While the old fluid is warm, completely drain and clean the reservoir (use of lint-free rags is recommended). Determine compatibility of coatings inside the reservoir, if one is present.
2. Drain and blow-out piping, tubing, headers, hoses, screw stacks and manifolds with clean dry air.
3. Drain pumps, accumulators, hydraulic motors and cylinders to ensure removal of all fluids.
4. Disassemble, wash and clean strainers.
5. Drain & clean filter housings. Determine filter element compatibility with Shell EcoSafe® EHC fluid and replace or clean as necessary. It is recommended to destroy replace filter elements initially as the gel and varnish decomposition products formed in phosphate esters are removed from the system.
6. Thoroughly drain and clean coolers.
7. Close system and circulate an adequate quantity of Shell EcoSafe® EHC Pumping Fluid sufficient to cover pump inlet.

SHELL
LUBRICANT SOLUTIONS

Conversion procedure available for converting to:

- Shell EcoSafe Turbine Fluids
- Shell EcoSafe EHC Fluids

SALES PRESENTERS

Introducing Shell EcoSafe EHC S3 DU 46/68

Shell EcoSafe EHC S3 DU, formerly EcoSafe EHC

- Is a synthetic fluid formulated using high viscosity index **polyalkylene glycol (PAG) base stocks** and a nonmetallic additive package
- Is **designed for EHC valve service** in steam and gas turbines, including high-pressure systems and systems with servo valves
- **Offers long-term system cleanliness and long service life**, as it is resistant to oxidative and thermal degradation and does not degrade to form varnish or sludge
- Is **inherently fire-resistant and readily biodegradable**
- Is **FM approved**

Offers long equipment life

- Meets or exceeds pump performance requirements, even at the highest operating pressures, and has excellent lubricity
- Hydrolytically stable, thereby minimizing the fluid degradation and acid formation that can damage hydraulic pumps
- Provides a high level of protection against wear and scuffing (stage 12 rating in FZG gear tests).
- High dielectric properties eliminate electrochemical erosion of EHC servo valves.

Introducing Shell EcoSafe Revive

Shell EcoSafe Revive is a synthetic, PAG-based solvency enhancer that can be incorporated into hydrocarbon-based turbine fluids to reduce the issues associated with varnish formation and product instability.

It is designed to

- **Repair fluids** with high varnish potential by improving solubility
- **Extend oil life and maintenance intervals** by reactivating additives trapped in varnish deposits by bringing them back into solution.



Introducing Shell EcoSafe Turbine Oil S5 X 25

Shell EcoSafe Turbine Oil S5 X 25, formerly EcoSafe TF-25

- Is a synthetic fluid designed to minimize varnish and sludge formation.
- It can help to **extend service life and reduce maintenance costs** through its exceptional protection against fluid breakdown, even under conditions of high oxidation and thermal stress.
- Its excellent resistance to varnish and sludge formation enables turbine systems to operate reliably by **preventing unplanned turbine outages** resulting from valve sticking.
- The fluid is formulated using an antifoam additive that, coupled with good air release, reduces the risk of pump cavitation, excessive wear and premature fluid oxidation.
- **Shell EcoSafe Turbine Fluid S5 X 25** meets or exceeds GE specification GEK 32568k.
- It is compatible with commonly used seals, hoses and metals, and is completely miscible with Shell Turbo T and Shell Turbo S4 products.

Short presenters available to you:

- Shell EcoSafe EHC S3 DU
- Shell EcoSafe Revive
- Shell EcoSafe S5 X 25

FAMILY BROCHURE



THE SHELL ECOSAFE RANGE

LOW-VARNISHING, POLYALKYLENE GLYCOL (PAG) BASED FLUIDS FOR TURBINES

EVEN A SMALL AMOUNT OF VARNISH CAN CAUSE SOPHISTICATED SERVO VALVES TO STICK, WHICH RESULTS IN TURBINE TRIPS, SIGNIFICANT MAINTENANCE AND REPAIR EXPENDITURE, AND FINANCIAL PENALTIES FOR MISSING GENERATING COMMITMENTS.



The move from Group I to Group III base stocks has produced more environmentally and worker-friendly oils, but it has reduced the oil's polarity and solubility. As these oils age, insoluble oxidation products precipitate out to form damaging varnish.

Removing varnish can become an ongoing and expensive cost. Varnish sludge requires downtime for piping installation and additional filter and system maintenance, and may not work, as there are many types of varnish. And they do not clean varnished surfaces.

The solution is to match the solubility of the base fluid and the oxidation products.

SHELL ECOSAFE POLYALKYLENE GLYCOL BASED FLUIDS

The PAG-based synthetic fluids for turbines in the Shell EcoSafe family contain polar molecules that can only break down to form polar by-products. As these products are similar in chemistry to the base fluid, they are soluble and remain within the base fluid (Figure 1). Without insoluble by-products, little or no varnish can form. This helps to reduce your maintenance and downtime, increase your generating capacity and reduce your total cost of ownership.

In addition to being low-varnishing, Shell EcoSafe Fluids provide exceptional equipment protection. They are designed for high-output gas and steam turbines and are specifically formulated to provide better oxidation and thermal stability compared with mineral-oil-based turbine oils. PAG-based fluids can also support more profitable and sustainable operations by helping to protect workers and the environment through their favorable health, safety and environmental profiles.

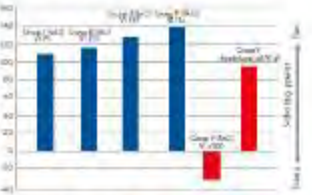


Figure 1. Like diesel-like, PAG-based fluids have low oxidative potential compared with mineral oil-based oils. They form greater solubility and less disruptive oxidation products, thereby preventing them from precipitating out and forming damaging varnish.

THE SHELL ECOSAFE RANGE

Shell offers a portfolio of fluids for turbines designed to meet diverse customer needs. These fluids include gas-to-liquids turbine oils such as Shell Turbo 54 X and Shell Turbo 54 GX, which are formulated to meet the demands of the latest high-efficiency systems, and oils for special applications, including Shell Turbo IN for ammonia turbo-compressors.

The PAG-based Shell EcoSafe range expands this portfolio to offer you high-performing, low-varnishing, long life, fire-resistant fluids, including:

- Shell EcoSafe Turbine Fluid 55 X 25 low-varnishing, top-tier gas and combined-cycle turbine fluid, formerly EcoSafe TT-25
- Shell EcoSafe Turbine Fluid 55 GX 25 low-varnishing, top-tier gas and combined-cycle turbine fluid for gas-turbine, formerly EcoSafe TT-25M
- Shell EcoSafe Revive solvency enhancer for cleaning varnish from rotating equipment, formerly EcoSafe Revive
- Shell EcoSafe EHC S3 DU fire-resistant and readily biodegradable hydraulic fluid for electrohydraulic control systems, formerly EcoSafe E4C

EXTENDING SERVICE LIFE

Shell EcoSafe Turbine Oil 55 X 25 can help to extend service life and reduce maintenance costs through its exceptional protection against fluid breakdown, even under conditions of high oxidation and thermal stress.

In 2007, a customer in Oklahoma (USA) used 200,000 gallons of 16 service-oil turbines in its two "reactors" GE-7FA units. It allocated these turbines and extended its service commitment to 2-3 years by switching to Shell EcoSafe Turbine Fluid 55 X 25. After 10 years, the varnish content of the fluid was 1/10th of the original value, the General Electric GE-7FA 25000 load/loss on expected fluids to experience decreased 20% of the loss when it was used. Consequently, the Shell EcoSafe Turbine Fluid 55 X 25 of the site has the longevity of a diamond.

Shell EcoSafe EHC S3 DU helps to extend the operational lifespan of steam and gas turbines with electrohydraulic control (EHC) valves, including high-pressure systems and systems with various valves.

The total cost of ownership (TCO) of Shell EcoSafe EHC S3 DU has been tracked for a customer in Nebraska, USA. The fluid started with a TAC of about 0.25 mg/KWH. Customer claimed when the TAC was low 0.25 mg/KWH, it was changed to 0.25 mg/KWH. After 10 years, the TAC was 0.01 mg/KWH. After 10 years, the EHC S3 DU has a TAC of only 0.01 mg/KWH (Figure 2).

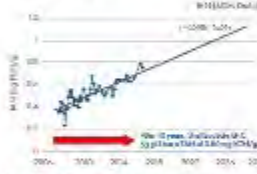


Figure 2. Long life expectancy. TAC of Shell EcoSafe EHC S3 DU has been tracked.

REMOVING VARNISH WHILE MAKING MEGAWATTS

If you're running on a diesel engine, but it's too slow to the cycle to justify total fluid conversion, adding Shell EcoSafe Revive solvency enhancer may be an effective solution.

Shell EcoSafe Revive is designed to repair fluid varnish caused by improving solubility and to the oil maintenance intervals by increasing its lifespan. It works by breaking down the varnish into smaller particles, which are then removed by the oil's natural cleaning action. This process does not require additional maintenance or oil change intervals.

Shell EcoSafe Revive is also used for cleaning varnish from the inside of the engine, thereby extending the need for chemical flushing when used to change fluids.

The following customer, a power plant in Georgia (USA), had 18 service-oil turbines or have started in one year across four GE-7FA. The fluid started with a TAC of about 0.25 mg/KWH. After 10 years, the TAC was 0.01 mg/KWH. The varnish was removed and the company had a successful and long-term solution.

Extending service life. Another power plant in 10% of 0.25 mg/KWH, which was again extending over 10 years. The Shell EcoSafe added to the research and the TAC fell to 0.01, thereby extending the company to keep its fluids.

AS THESE OILS AGE, INSOLUBLE OXIDATION PRODUCTS PRECIPITATE OUT TO FORM DAMAGING VARNISH.

PREVENTING OUTAGES AND REDUCING MAINTENANCE

Shell EcoSafe fluids do not degrade to form wax or sludge and have excellent resistance to oxidative and thermal stability. These properties help to prevent equipment failure and reduce maintenance costs (Figure 3 and 4).



Figure 3. Outage and maintenance. A small amount of varnish on the valve of Shell EcoSafe Turbine Fluid 55 X 25.



Figure 4. Low maintenance. Shell EcoSafe Fluid 55 X 25 has excellent resistance to oxidative and thermal stability, helping to prevent equipment failure and reduce maintenance costs.



SPECIFICATIONS, APPROVALS AND RECOMMENDATIONS

General Electric specifies GE-7FA 25000 the use of PAG-based fluids for its large-scale gas turbines, ensuring that you get the best performance in generating power.

PRODUCT	FORM NAME	ISO GRADE	ISO GRADE	APPROVALS AND RECOMMENDATIONS
Shell EcoSafe Turbine Fluid 55 X 25	Turbine Fluid 55 X 25	ISO-Grade: AGC	45	General Electric, GE-7FA 25000 and other large-scale gas turbines
Shell EcoSafe Turbine Fluid 55 GX 25	Turbine Fluid 55 GX 25	ISO-Grade: AGC	45	General Electric, GE-7FA 25000 and other large-scale gas turbines
Shell EcoSafe Revive	Revive	ISO-Grade: AGC	15	Solvency enhancer for cleaning varnish from rotating equipment
Shell EcoSafe EHC S3 DU	EHC S3 DU	ISO-Grade: AGC	45, 68	Electrohydraulic fluid for the GE-7FA 25000 and other large-scale gas turbines

CONTACT US

For more information, please contact your local distributor or visit our website at www.shell.com.

MORE RESOURCES



OEM & MARINE



Other product sell sheets available to you for OEM & Marine:

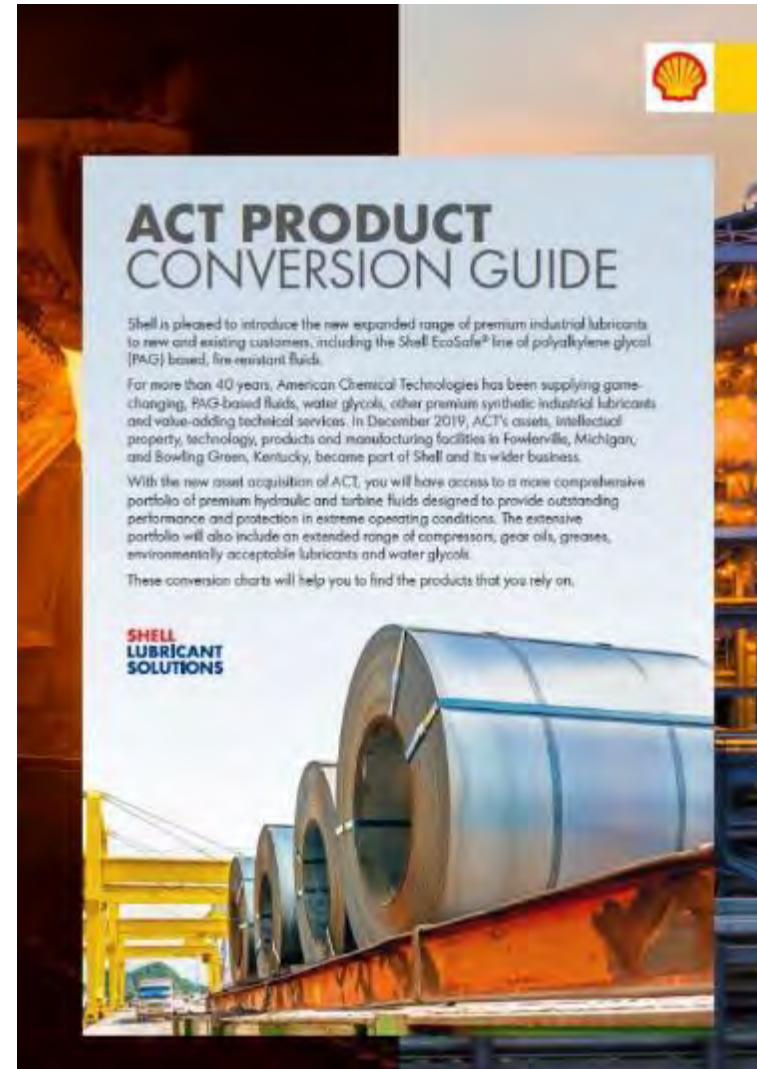
- Shell Corena S6 A
- Shell Gas Compressor S4 PGS V
- Shell Biodegradable Hydraulic Fluid
- Shell Omala S3 W
- Shell Water Soluble Hydraulic Fluid




Resources available now will be added to distributor flash drives, and ToolKit

FROM-TO PRODUCT LISTS

PRODUCT NAME TRANSITION - SHELL GSAP SKU					
ACT Product	Act Size	ACT/Victoria Number	New Shell Name	Shell GSAP Material Number	Shell GSAP SKU Name
CAD40N5B-D	BU	CAD40N5B-D BU	Heat Transfer Fluid - 400NSB	500012032	HTF - 400/NSB_BULK_A03Q
CAD40N5B-D	FB	CAD40N5B-D FB	Heat Transfer Fluid - 400NSB	500012032	HTF - 400/NSB_1*180kg_A31U
CLEP1	FB	CLEP1 FB	Shell Galdol 32 HO Coupling Grease 1	500056609	Galdol 32 HO Couplr 1_1*1000kg_NAM0
CLEP1	CS	CLEP1 CS	Shell Galdol 32 HO Coupling Grease 1	500056610	Galdol 32 HO Couplr 1_32*0.4kg_NAM0
CLEP1	BU	CLEP1 BU	Shell Galdol 32 HO Coupling Grease 1	500012230	Galdol 32 HO Couplr 1_BULK_A03Q
CLEP1	DR	CLEP1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
CLEP1	KG	CLEP1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
CLEP1	FL	CLEP1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
DL480	CS	DL480 CS	Shell Galdol 33 U220A 1	500026641	Galdol 33 U220A 1_30*0.4kg_NAM0
DL480	BU	DL480 BU	Shell Galdol 33 U220A 1	500012135	Galdol 33 U220A 1_BULK_A03Q
DL480	FB	DL480 FB	Shell Galdol 33 U220A 1	500056640	Galdol 33 U220A 1_1*1000kg_NAM0
DL480	KG	DL480 KG	Shell Galdol 33 U220A 1	500056637	Galdol 33 U220A 1_1*50kg_WL_NAM0
DL480	FL	DL480 FL	Shell Galdol 33 U220A 1	500056636	Galdol 33 U220A 1_1*30kg_NAM0
DL480-00	FB	DL480-00 FB	Shell Galdol 33 U220A 00	500056635	Galdol 33 U220A 00_1*1000kg_NAM0
DL480-00	BU	DL480-00 BU	Shell Galdol 33 U220A 00	500012134	Galdol 33 U220A 00_BULK_A03Q
DL480-00	DR	DL480-00 DR	Shell Galdol 33 U220A 00	500056634	Galdol 33 U220A 00_1*180kg_WL_NAM0
DL480-00	KG	DL480-00 KG	Shell Galdol 33 U220A 00	500056632	Galdol 33 U220A 00_1*50kg_WL_NAM0
DL480-00	FL	DL480-00 FL	Shell Galdol 33 U220A 00	500056633	Galdol 33 U220A 00_1*30kg_NAM0
DL480-00	CS	DL480-00 CS	Shell Galdol 33 U220A 00	500056638	Galdol 33 U220A 00_32*0.4kg_NAM0
DL480-1	DR	DL480-1 DR	Shell Galdol 33 U220A 1	500056639	Galdol 33 U220A 1_1*180kg_WL_NAM0
DL480HD-0	DR	DL480HD-0 DR	Shell Galdol 33 U480AC 0	500057776	Galdol 33 U480AC 0_1*50kg_WL_NAM0
DL480HD-0	BU	DL480HD-0 BU	Shell Galdol 33 U480AC 0	500012413	Galdol 33 U480AC 0_BULK_A03Q
DL480HD-0	FB	DL480HD-0 FB	Shell Galdol 33 U480AC 0	500057776	Galdol 33 U480AC 0_1*1000kg_NAM0
DL480HD-0	KG	DL480HD-0 KG	Shell Galdol 33 U480AC 0	500057778	Galdol 33 U480AC 0_1*50kg_WL_NAM0
DL480HD-0	FL	DL480HD-0 FL	Shell Galdol 33 U480AC 0	500057777	Galdol 33 U480AC 0_1*50kg_NAM0
DL480HD-0	CS	DL480HD-0 CS	Shell Galdol 33 U480AC 0	500057810	Galdol 33 U480AC 0_32*0.4kg_NAM0
DL480HD-00	DR	DL480HD-00 DR	Shell Galdol 33 U480AC 00	500057813	Galdol 33 U480AC 00_1*180kg_WL_NAM0
DL480HD-00	BU	DL480HD-00 BU	Shell Galdol 33 U480AC 00	500012414	Galdol 33 U480AC 00_BULK_A03Q
DL480HD-00	FB	DL480HD-00 FB	Shell Galdol 33 U480AC 00	500057814	Galdol 33 U480AC 00_1*1000kg_NAM0
DL480HD-00	KG	DL480HD-00 KG	Shell Galdol 33 U480AC 00	500057811	Galdol 33 U480AC 00_1*50kg_WL_NAM0
DL480HD-00	FL	DL480HD-00 FL	Shell Galdol 33 U480AC 00	500057812	Galdol 33 U480AC 00_1*30kg_NAM0
DL480HD-00	CS	DL480HD-00 CS	Shell Galdol 33 U480AC 00	500057815	Galdol 33 U480AC 00_32*0.4kg_NAM0
DL480HD-1	BU	DL480HD-1 BU	Shell Galdol 33 U480AC 1	500012331	Galdol 33 U480AC 1_BULK_A03Q
DL480HD-1	DR	DL480HD-1 DR	Shell Galdol 33 U480AC 1	500056913	Galdol 33 U480AC 1_1*180kg_WL_NAM0
DL480HD-2	FB	DL480HD-2 FB	Shell Galdol 33 U480AC 1	500056914	Galdol 33 U480AC 1_1*1000kg_NAM0





ACT PRODUCT CONVERSION GUIDE

Shell is pleased to introduce the new expanded range of premium industrial lubricants to new and existing customers, including the Shell EcoSafe® line of polyalkylene glycol (PAG) based, fire resistant fluids.

For more than 40 years, American Chemical Technologies has been supplying game-changing, PAG-based fluids, water glycols, other premium synthetic industrial lubricants and value-adding technical services. In December 2019, ACT's assets, intellectual property, technology, products and manufacturing facilities in Fowlerville, Michigan, and Bowling Green, Kentucky, became part of Shell and its wider business.

With the new asset acquisition of ACT, you will have access to a more comprehensive portfolio of premium hydraulic and turbine fluids designed to provide outstanding performance and protection in extreme operating conditions. The extensive portfolio will also include an extended range of compressors, gear oils, greases, environmentally acceptable lubricants and water glycols.

These conversion charts will help you to find the products that you rely on.

SHELL LUBRICANT SOLUTIONS



ACT PRODUCT CONVERSION GUIDE HYDRAULIC FLUIDS

ACT Product	Act Size	ACT/Victoria Number	New Shell Name	Shell GSAP Material Number	Shell GSAP SKU Name
ACT-HF-1	BU	ACT-HF-1 BU	Heat Transfer Fluid - 400NSB	500012032	HTF - 400/NSB_BULK_A03Q
ACT-HF-1	FB	ACT-HF-1 FB	Heat Transfer Fluid - 400NSB	500012032	HTF - 400/NSB_1*180kg_A31U
ACT-HF-1	CS	ACT-HF-1 CS	Shell Galdol 32 HO Coupling Grease 1	500056609	Galdol 32 HO Couplr 1_1*1000kg_NAM0
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	BU	ACT-HF-1 BU	Shell Galdol 32 HO Coupling Grease 1	500012230	Galdol 32 HO Couplr 1_BULK_A03Q
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	CS	ACT-HF-1 CS	Shell Galdol 32 HO Coupling Grease 1	500056609	Galdol 32 HO Couplr 1_1*1000kg_NAM0
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	BU	ACT-HF-1 BU	Shell Galdol 32 HO Coupling Grease 1	500012230	Galdol 32 HO Couplr 1_BULK_A03Q
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	CS	ACT-HF-1 CS	Shell Galdol 32 HO Coupling Grease 1	500056609	Galdol 32 HO Couplr 1_1*1000kg_NAM0
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	BU	ACT-HF-1 BU	Shell Galdol 32 HO Coupling Grease 1	500012230	Galdol 32 HO Couplr 1_BULK_A03Q
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	CS	ACT-HF-1 CS	Shell Galdol 32 HO Coupling Grease 1	500056609	Galdol 32 HO Couplr 1_1*1000kg_NAM0
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	BU	ACT-HF-1 BU	Shell Galdol 32 HO Coupling Grease 1	500012230	Galdol 32 HO Couplr 1_BULK_A03Q
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	CS	ACT-HF-1 CS	Shell Galdol 32 HO Coupling Grease 1	500056609	Galdol 32 HO Couplr 1_1*1000kg_NAM0
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	BU	ACT-HF-1 BU	Shell Galdol 32 HO Coupling Grease 1	500012230	Galdol 32 HO Couplr 1_BULK_A03Q
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	CS	ACT-HF-1 CS	Shell Galdol 32 HO Coupling Grease 1	500056609	Galdol 32 HO Couplr 1_1*1000kg_NAM0
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	BU	ACT-HF-1 BU	Shell Galdol 32 HO Coupling Grease 1	500012230	Galdol 32 HO Couplr 1_BULK_A03Q
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	CS	ACT-HF-1 CS	Shell Galdol 32 HO Coupling Grease 1	500056609	Galdol 32 HO Couplr 1_1*1000kg_NAM0
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	BU	ACT-HF-1 BU	Shell Galdol 32 HO Coupling Grease 1	500012230	Galdol 32 HO Couplr 1_BULK_A03Q
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	CS	ACT-HF-1 CS	Shell Galdol 32 HO Coupling Grease 1	500056609	Galdol 32 HO Couplr 1_1*1000kg_NAM0
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	BU	ACT-HF-1 BU	Shell Galdol 32 HO Coupling Grease 1	500012230	Galdol 32 HO Couplr 1_BULK_A03Q
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
ACT-HF-1	CS	ACT-HF-1 CS	Shell Galdol 32 HO Coupling Grease 1	500056609	Galdol 32 HO Couplr 1_1*1000kg_NAM0
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
ACT-HF-1	KG	ACT-HF-1 KG	Shell Galdol 32 HO Coupling Grease 1	500056606	Galdol 32 HO Couplr 1_1*50kg_WL_NAM0
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ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0
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ACT-HF-1	FL	ACT-HF-1 FL	Shell Galdol 32 HO Coupling Grease 1	500056607	Galdol 32 HO Couplr 1_1*50kg_NAM0
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ACT-HF-1	CS	ACT-HF-1 CS	Shell Galdol 32 HO Coupling Grease 1	500056609	Galdol 32 HO Couplr 1_1*1000kg_NAM0
ACT-HF-1	DR	ACT-HF-1 DR	Shell Galdol 32 HO Coupling Grease 1	500056608	Galdol 32 HO Couplr 1_1*180kg_WL_NAM0

WHITEPAPERS

UNDERSTANDING THE USE CASE OF POLYALKYLENE GLYCOL (PAG) AND POLYALPHAOLEFIN (PAO) FLUIDS

BREAKING DOWN THE PROS AND CONS TO UNDERSTAND THE BETTER CHOICE FOR YOUR OPERATIONS

EXECUTIVE SUMMARY

The use of synthetic lubricants in various industrial and automotive applications is becoming commonplace, thanks to the advances being made by lubricant manufacturers and the association of the term "synthetic" with high quality and high performance. However, it should be noted that not all synthetics are created equal and there are multiple formulations behind the science of synthetic lubricants that can complicate making the right choice when it comes to what synthetic lubricant is ideal for a particular use case.

There are multiple categories of lubricants, with the primary category being intended application. Users first select a lubricant based upon its intended usage; for example, lubricants are chosen for applications such as engine oil, transmission oil, hydraulic oil, wire rope lubricant, electric motor grease, and so forth. Ultimately, users already know what application they need the lubricant for and choose a lubricant based upon the intended application.

However, identifying the application for the lubricant proves to be the simplest task for a user, who just has to know what the lubricant is for and what the

minimum requirements are for the subject piece of equipment. Things become a little more complicated when it comes to deciding upon a formulation of that particular lubricant, where users may have to guess a basic understanding of the chemical composition of the lubricant. For example, there are lubricants that are classified as mineral oils, synthetic fluids, or baseoiled fluids. Further adding to the confusion is the lubricant marketer's use of descriptors such as full synthetic, 100 percent synthetic, partial synthetic, paraffinetic, synthetic blend, and other denotations.

Ultimately, it all comes down to the base fluid used in the formulation of a lubricant and in the world of synthetic fluids, there are two major types of synthetic formulations, Polyalkylene glycol (PAG) fluids and Polyalphaolefin (PAO) fluids. PAO is the most common synthetic formulation used in industrial and automotive lubricants.¹ It is a synthetic hydrocarbon (SHC) that mimics the best hydrocarbon (branched) structure found in mineral oils. PAG was developed in the 1930s and was used commercially as a base for engine oils starting in the 1970s. PAG fluids were created under mandate from the U.S. Navy in response to hydraulic fluid fires on ships resulting

THE MANY BENEFITS OF SHELL WATER-GLYCOL FIRE-RESISTANT HYDRAULIC FLUIDS

EXECUTIVE SUMMARY

The importance of hydraulic fluid cannot be overstated. After all, hydraulic fluid has become the lifeblood of most industrial pieces of machinery and serves many purposes in industry. Yet, many organizations look at hydraulic fluids as just another consumable to be purchased and disposed of as needed. But, selecting the proper hydraulic fluid can contribute to plant efficiency and ultimately help reduce costs. That realization has driven a great deal of innovation in the hydraulic fluid market, bringing more choices to industry and further complicating the landscape.

Recent innovations, such as the introduction of water-glycol hydraulic fluids, have created new usage models that surpass what was once offered by mineral-based hydraulic fluids. Understanding the opportunities presented by these newer developments is a worthwhile consideration for industries trying to achieve higher efficiencies, extended service life, and environmental requirements. For many industries the answer to those demands comes in the form of the latest water-glycol hydraulic fluids, which are proving to be a clear change to other water-based fluids currently available.

The versatility of the latest water-glycol hydraulic fluids allows those fluids to be used in a multitude of use cases. Today, water-glycol hydraulic fluids can be used in most any situation that previously called for mineral oil-based fluids.² Identifying suitable use cases is the first step in realizing the benefits that water-glycol hydraulic fluids can bring to industry.

INTRODUCTION

Water-glycol based hydraulic fluids were first introduced as a solution to oil board fire problems in the U.S. Navy. During World War II, the US Navy discovered that mineral oils were not fire-resistant enough to survive the rigors of combat and subsequently initiated a program to create fire-resistant hydraulic fluids.³

That program led to the development of water-glycol hydraulic fluids, which proved to be both fire-resistant and able to meet the rigorous needs of the U.S. Navy. Water-glycol hydraulic fluids were commercialized in 1947 and offered vastly improved fire resistance relative to mineral oils in use at the time.

SHELL ECOSAFE HYDRAULIC FLUIDS: DELIVERING VALUE ACROSS THE INDUSTRIAL SPACE

THE ECOSAFE FAMILY OF HYDRAULIC FLUIDS DELIVER EXCELLENT PERFORMANCE ADVANTAGES TO A VARIETY OF INDUSTRIES WHILE LOWERING OPERATIONAL COSTS AND REDUCING ENVIRONMENTAL IMPACT

EXECUTIVE SUMMARY

The use of hydraulic fluids dates back thousands of years and in its original form, H₂O, was used by the ancient Egyptians and Greeks to irrigate crops, drive very basic machinery, such as waterwheels, watermills, and even for mining operations to strip away materials. Today, hydraulic fluids have come a long way, starting with the use of mineral oils in the 1920s to improve lubrication, the adoption of natural oils, such as canola oil, and finally to the latest synthetics available today.⁴

The spectrum of choices available now can make choosing the most suitable high-performance hydraulic fluid for modern machinery a complex endeavor. Selection not only involves equipment manufacturer recommendations, but also critical concerns, such as fire resistance, biodegradability, service life, compatibility, and several other metrics that should be considered.

However, choosing a hydraulic fluid for any given piece of equipment can be made a little easier as long as you have access to some basic knowledge about hydraulic fluids and garner an understanding of what criteria matters most for a given situation. Ultimately, the best choice comes down to meeting or exceeding equipment requirements and balancing that against service life, as well as the economy offered by that selection. This white paper will discuss the most recent advances in hydraulic fluid technology and the impact those advances will have on industry.

INTRODUCTION

Equipment requiring hydraulic fluids can be found in a number of industries, such as factories, construction equipment, power plants, vehicles, aircraft, and even in healthcare. Hydraulic systems are used for a variety of tasks and the key component of making those systems work is the hydraulic fluid used. Today, there

Resources available now will be added to distributor flash drives, and ToolKit

CASE STUDY, GIF, VIDEO'S



A Switch to Shell EcoSafe S1 DU 40 Reversed Varnishing and Saved McWane Ductile \$168k per Year



Challenge:
An ill-matched hydraulic fluid was leading to harmful build-up and an unhealthy work environment

The McWane Ductile foundry in Texas, which was struggling with varnish and heatability in their hydraulic systems because the hydraulic fluid they were using was not able to withstand the high temperatures of foundry work. This allowed varnish and sludge to build up in the sensors and control valves, leading to the hydraulic pumps repeatedly failing.

The two-based hydraulic fluid also developed a bad smell over time and enabled the growth of mold, contributing to an unhealthy and uncomfortable environment for workers.

They needed a Factory Mutual Global approved replacement that could solve these issues. It also had to be compatible and price competitive with their current hydraulic fluid to ensure a zero production downtime changeover.



THE WORLD RELIES ON YOUR EQUIPMENT

And your equipment relies on a wide variety of lubricants and services to keep it operating efficiently.



OUR INDUSTRIAL LUBRICANTS PORTFOLIO HAS JUST EXPANDED

You now have access to an integrated and unmatched offering that includes the **Shell EcoSafe® family of hydraulic and turbine industrial fluids.**

AN ENHANCED PRODUCT LINE

Designed to safely extend oil life, reduce maintenance costs, and improve productivity while reducing environmental impact.



IMAGINE A SINGLE SUPPLIER WHO CAN MANAGE ALL YOUR NEEDS, PROVIDING HIGH-QUALITY LUBRICANTS AND VALUE-ADDING PRODUCTS

Products that include a highly-advanced line of PAGs, PAOs, GIL, synthetics, waterglycols, and mineral oil products solutions.




NEW NAME AND PACKAGING



IT NOW INCLUDES THE SHELL ECOSAFE® FAMILY OF HYDRAULIC AND TURBINE INDUSTRIAL FLUIDS

Resources available now and will be added to distributor flash drives, and ToolKit

TECHNICAL DATA SHEETS



Technical Data Sheet

Formerly Known As: **EcoSafe FR-46**

Shell EcoSafe S3 DU 46

Fire Resistant (HFDU) and Readily Biodegradable Hydraulic Fluid

Shell EcoSafe S3 DU 46 is a synthetic fire-resistant hydraulic fluid, based on very high VI, polyalkylene glycol (PAG) base stocks, coupled with a proven ashless additive package. Shell EcoSafe S3 DU 46 has been designed to minimize fluid degradation and thus extend fluid changeout intervals under even the most severe operating conditions. Shell EcoSafe S3 DU 46 provides the performance properties demanded by today's high-performance hydraulic systems. Shell EcoSafe S3 DU 46 is readily biodegradable and is particularly suited for use in environmentally sensitive areas.

DESIGNED TO MEET CHALLENGES

Performance, Features & Benefits




- Excellent fire resistance**
Shell EcoSafe S3 DU 46 is inherently fire-resistant and is FM Approved, offering high flash point, high fire point and high auto-ignition temperature. It minimizes the risk of fire, which could potentially be caused by mineral oil products.
- Enhanced system protection**
Shell EcoSafe S3 DU 46 offers excellent lubricity, for outstand pump life under the most severe conditions. The fluid meets or exceeds the pump performance of premium, anti-wear mineral oils, even at 5,500 psi (380 bar) operating pressure. Shear stability is excellent. Shell EcoSafe S3 DU 46 achieved a 13-stage rating in the FZG Gear Test demonstrating a high level of protection against wear and scuffing.
- Good hydrolytic stability**
Shell EcoSafe S3 DU 46 will not break down and react with water, minimizing fluid degradation and acid formation that can damage and eventually destroy hydraulic pumps. No acid removal/exchange filters are required.
- High resistance to sludge or varnish formation**
Shell EcoSafe S3 DU 46 is formulated to provide high resistance against varnish and sludge formation. Field experience has shown long-term system cleanliness while extending maintenance intervals and service life. In addition, this fluid is very stable at high temperatures and resistant to thermal degradation up to 120°C.

Suitable for all-weather service
A high viscosity index in combination with excellent low-temperature fluidity provide a year-round fluid that protects the machine from cavitation at cold startups and provides durability at higher operating temperatures.

Excellent compatibility
While Shell EcoSafe S3 DU 46 is compatible with many different types of fluids, to ensure proper system performance, it is recommended to properly clean and flush hydraulic systems during conversions. Shell EcoSafe S3 DU 46 is compatible with commonly used seals, hoses and metals.

Detailed flushing procedures and compatibility data are available upon request.

Main Applications



Hydraulic fluid
Shell EcoSafe S3 DU 46 can be used as the hydraulic fluid in industrial and mobile equipment, including high-pressure systems, hydrostatic drives, systems with servo valves, and robotics.

70+ Technical Data Sheets available to you via the electronic product catalog:

Heat Transfer Fluid - 400NSB
Heat Transfer Fluid - 460NSB
Lube 11 HWB
Shell Air Compressor Oil S2 R 32
Shell Air Compressor Oil S2 R 38
Shell Centrifugal Compressor Fluid 25
Shell Corena E15 46
Shell Corena PCF
Shell Corena Rotary Screw Compressor Cleaner Concentrate
Shell Corena S5 A 32
Shell Corena S6 A 46
Shell Stern Tube Lubricant 100
Shell Stern Tube Lubricant 150
Shell EcoSafe EAL 46
Shell EcoSafe EAL 68
Shell EcoSafe EAL Concentrate
Shell EcoSafe EHC Flushing Fluid
Shell EcoSafe EHC S3 DU 46
Shell EcoSafe EHC S3 DU 68
Shell EcoSafe L10
Shell EcoSafe Nuclear 46
Shell EcoSafe Revive
Shell EcoSafe Revive-L
Shell EcoSafe S1 DU 32
Shell EcoSafe S1 DU 40
Shell EcoSafe S1 DU 60
Shell EcoSafe S3 DU 100
Shell EcoSafe S3 DU 32
Shell EcoSafe S3 DU 46
Shell EcoSafe S3 DU 68
Shell EcoSafe Turbine Fluid S5 GX 25
Shell EcoSafe Turbine Fluid S5 X 25
Shell EcoSafe Turbine Fluid S5 X 32
Shell EcoSafe VM 46
Shell Fire Resistant Food Grade 46
Shell Fire Resistant HFA
Shell Gadus S2 HD Coupling Grease 1

Shell Gadus S2 Steel Mill Grease 2
Shell Gadus S2 Steel Spindle Grease
Shell Gadus S3 U220A 00
Shell Gadus S3 U220A 1
Shell Gadus S3 U460AC 0
Shell Gadus S3 U460AC 00
Shell Gadus S3 U460AC 1
Shell Gadus S3 U460AC 2
Shell Gadus S3 U460AD 1
Shell Gadus S3 U460AD 2
Shell Gadus S3 V460T 1.5
Shell Gas Compressor S4 PGS V 150
Shell Gas Compressor S4 PGS V 220
Shell High Temperature Oil 103
Shell Naturelle S4 U68AD 1.5
Shell Naturelle S4 Wire Line Grease 1.5
Shell Naturelle S6 Hydraulic Fluid 22
Shell Naturelle S6 Hydraulic Fluid 32
Shell Naturelle S6 Hydraulic Fluid 46
Shell Naturelle S6 Hydraulic Fluid 68
Shell Omala S2 A 320
Shell Omala S3 A 220
Shell Omala S3 A 320
Shell Omala S3 A 460
Shell Omala S3 W 100
Shell Omala S3 W 150
Shell Omala S3 W 220
Shell Water Soluble Hydraulic Fluid 32
Shell Water Soluble Hydraulic Fluid 46
Shell Water Soluble Hydraulic Fluid 68
Shell Water-Glycol Buffer
Shell Water-Glycol Concentrate
Shell Water-Glycol Extreme Pressure 46
Shell Water-Glycol S2 C 32
Shell Water-Glycol S2 C 46
Shell Water-Glycol S2 C 68
Shell Water-Glycol S3 CX

WEBSITE – SHELL.US/ECOSAFE



EXPANDING THE PORTFOLIO WITH PAG-BASED FLUIDS

Shell is pleased to introduce the new expanded range of Industrial Lubricants to new and existing customers, including Shell EcoShell line of polyalpha-olefin (PAO) - based fluid-based fluids.

Contact Our Technical Experts

OUR NEW PORTFOLIO

With the new acquisition of ACT, you will have access to a more comprehensive portfolio of hydraulic and turbine fluids designed to provide outstanding performance and protection in extreme operating conditions. The extensive portfolio will also include an extensive range of compressors, gear oils, greases, nonaqueous lubricants, and water-glycols.

For more than 40 years, Amoco Chemical Technologies has been supplying game-changing PAO-based fluids, water-glycols, other premium synthetic industrial lubricants, and value-adding technical services. In December 2015, ACT assets, intellectual property, technology, products, and manufacturing facilities in Fowlerville, Michigan, and Bowling Green, Kentucky, became part of Shell and its wider business.



At the heart of the portfolio are PAG-based synthetic lubricants, which help provide excellent equipment protection, reduce the impact on the environment, and support more profitable and sustainable operations.



The products meet stringent industry standards and are pre-approved in modern ISO 14001 registered facilities. Their favorable health, safety and environmental profiles can help you meet government regulatory requirements.



The high-specialist lubricants include fire-resistant hydraulic fluids for use in demanding high-temperature environments, turbine fluids for large power-generation gas turbines, and other synthetic products.



Legacy ACT Customers

Access the latest information on its product information here Shell

View latest information

PRODUCTS OVERVIEW



Shell EcoSafe Hydraulic Fluids

Shell EcoSafe Hydraulic Fluids are premium lubricants designed for use in hydraulic systems. Their advanced PAO technology, superior performance, and excellent operational costs are reducing environmental impact.



Shell EcoSafe Turbine Fluids

Shell EcoSafe Turbine Fluids are designed to provide outstanding performance in extreme conditions. They offer excellent equipment protection, longer fluid life, and excellent sustainability scores.

RESOURCES

WEBINAR - Evolution of PAGs: Providing Chemical Solutions to Chemical Problems

Learn more about PAG-based lubricants in this free, on-demand webinar.

Watch Now



TRAINING



PORTFOLIO TRAINING

Introducing Shell PAG Portfolio



Shell EcoSafe Turbine Fluids



Shell EcoSafe FR Hydraulic Fluids



Shell PAG Compressor Fluids



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