HÄGGLUNDS DENISON

REÇU LE
-5 OCT 1993

Vierzon le 1er Octobre 1993

Réf. 881.10.93.jc Fl. KUWAIT

KUWAIT PETROLEUM FRANCE
209 Bureaux de la Colline
92213 ST. COULD Cédex

A l'attention de Monsieur CATTONI,

Monsieur,

Veuillez trouver ci-joint une copie de notre SK-30320-0 où nous avons ajouté à l'appendix A votre fluide ESTER

Q8 HOLBEIN 32

Ce fluide est holomogué par DENISON FRANCE pour faire partie des fluides HF.2.

Nous vous prions de recevoir, MONSIEUR, nos salutations sincères.

Ph. PARREAU

DENISON | Hydraulics

TECHNICAL PRODUCT INFORMATION	TPI - 432 - 06 - 92 Group 2 Rev. SEPT. 93

ENVIRONMENTALLY ACCEPTABLE HYDRAULIC FLUIDS.

Would you please find herewith HÄGGLUNDS DENISON **"Standard" procedures**

- **A.SK-30320** — **environmentally acceptable hydraulic fluids**
  also known as biodegradable fluids : Ester base, Rapeseed base, or polyglycol meeting DIN 51524- 2 & 3.
  [Pages 1, 2, 6, & 7 rev. Nov.25. 92 ; Page 4 rev. Dec.17.92 ; Pages 3 & 5 rev. Sept.30 93]

- **A.TP-30283-A**
  F.TP-30283-A — **test equipment & procedure for hydraulic fluids performance evaluation on vane pumps**
  [From page 1 and page 3 to 8 and appendixes A, B, C, D, rev. b July 12, 93 ; Page 2 rev. c Sept.24, 93]

- **A.TP-30338**
  F.TP-30338 — **biodegradable hydraulic fluid operation test procedure**
  [Pages 1 & 2 and appendix A rev. b Aug.08, 93].

Please dispatch to all the people involved.

Best regards,

Encl's Specifications HD

Vierzon, 1993 SEPTEMBER 30

R.CHERRIER

DENISON | Hydraulics

GET INVOLVED !

TECHNICAL PRODUCT INFORMATION	TPI - 416 - 08 - 90 Gr. 2 Rev. TPI-428 - 04 - 92 Rev. TPI-432-05-93 Gr.2

ENVIRONMENTALLY ACCEPTABLE HYDRAULIC FLUIDS.

Would you please find herewith a HÄGGLUNDS DENISON **"Standard" procedure SK-30320**, giving some technical information on **environmentally acceptable hydraulic fluids**, also known as biodegradable fluids : Ester base, Rapeseed base, or polyglycol meeting DIN 51524- 2 & 3.

Most of these reference fluids come only from three to four different stock sources, but are sold under different brand names and different suppliers.

Some of these fluids are under evaluation on mainly Mobile applications and some are under laboratory test following our **T6C 020** Vane Pump test TP-30283.

Until now, if our recommendations [see page 1 of SK-30320] are followed, it should be no field problem with our T6 & M4 Vane units.

Remember the main problems which may happen are :
- Too hot running [over 80° C for Ester and 70° C for Rapeseed base].
- Too low temperature, mainly with Rapeseed base fluids.
- Water contamination greater than 500 PPM.

If any of these recommendations cannot be applied, please send us all the technical data of the application involved for more investigation and additional recommendations.

We have to concider this technical specification as an approach for a new HÄGGLUNDS DENISON HF specification. As most of these fluids are of the first generation, they will be improved and our technical data will change from time to time.

As most of our competitors, end-users or country legislations, we have not so much experience on these fluids and all of us have to be very careful in our application approval.

For example : Toxicity, aging of the fluid are not very well known and they may show environment and human acceptance more critical than present mineral oil.

Please dispatch to all the people involved

Best regards,

Vierzon, 1992 April 27
* Rev 1993 May 04

R. CHERRIER.

The fluids listed in "Appendix A" can be used with H.D. Vane Products at HF.0 / HF.2 catalogue pressure ratings.

Recommendations :

1. **Minimum absolute inlet pressure value**
   Measure at inlet flange listed in catalogue should be multiplied by a factor 1,1 for ester and vegetable Rapeseed base and 1,25 for polyglycol, [or reduce maximum speed].

2. **Suction strainer**
   No strainer for operation under 10° C for vegetable and polyglycol fluids.

3. **Minimum temperature – 20° C**
   In some case, limit to – 10° C for vegetable base depending on viscosity index (with or without pour point improver).

4. **Maximum temperature + 70° C**

5. **Maximum content of water 0,05 %.**

   Higher amount of water : drain off, or change fluid .

   Risk of condensation : for any kind of Mobile machineries install a water bleed off at the lowest point of the reservoir and drain off every 200 hours some samples of 1 litre.

6. **Return or pressure line filters.** [Minimum recommended $\beta_{20} > 100$].

   Size 1,5 to 2 times larger than those for mineral oil base fluids.
   Paper filter element is not acceptable for polyglycols.

7. **Oxidation during operation**
   Change immediately the fluid, then flush properly the circuit.
   Change filter elements after 30 hours.

8. **Assembly**
   Pump is installed on the circuit during more than 6 months without operation : manually turn shaft prior to pump starting up to make sure parts are not stuck.

9. **Polyglycol fluids**

   - Do not paint or paint with epoxy base the pump and the reservoir.
   - Avoid any contamination, polyglycol being not mixible with mineral or vegetable fluids. [Maximum amount of foreign oil 1 %].
   - Recommended seals are VITON [S5 compound].

10. **Fluid change**
    Change fluid from mineral oil to one of these biodegradable fluids.
    Flush the circuit with one full reservoir filled of biodegradable fluid, then replace by a brand new fluid.
    Change filter elements after 30 hours of operation.

See : APPENDIX A **Manufacturer & fluid brand list.**

Nota : This list is to be considered as the reference of fluids existing in the market place.These fluids can be applied on H.D. Vane products under above-mentioned recommendations (1 to 10).

ECNF.00569
92 NOV.25.

Révisions

Préparé par	Date	ENGINEERING	MÉTHODES	CONTRÔLE	PRODUCTION	QUALITÉ	MONTAGE
J.R.CHERRIER	90 AUG.22	R.CHERRIER				M.GOUESTE	

HÄGGLUNDS DENISON

APPENDIX A

ENVIRONMENTALLY ACCEPTABLE HYDRAULIC FLUIDS

Manufacturer & Fluid brand list.

- * Fluid(s) under field test evaluation or laboratory test with acceptable performances on H.D. Vane Pump applications.
- ** Can be used up to 70° C.

Base stock	ESTER		VEGETABLE RAPESEED		POLYGLYCOL	
	Viscosity at 40° C grade					
Manufacturers	ISO 22	ISO 32	ISO 22	ISO 32	ISO 22	ISO 32
ARAL						
AVIA				HYDRAULIC BIO 32		HYDROSYNTH 32
BECHEM				BIOHYDRAU-LIKÖL 32		HYDROSTAR UWF 32
BLASER						
BP						
BUCHER MOTOREX				OKOHYDRO 3268		
CASTROL				BIOTEC HVX		
DEA				ECONA R 32		
DELTIN						
ELF						
ESSO				* HYDRAU-LIKÖL PFL		HYDRAU-LIKÖL PGK 32
EWA [AUSTRIA]						
FINKE				AVIATICON HV-BD 36		
FUCHS						
FRAGOL				HYDRAULIC V32	*HYDRAULIC TR 22	*HYDRAULIC TR 32

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Base stock	ESTER		VEGETABLE RAPESEED		POLYGLYCOL	
	Viscosity at 40° C grade					
Manufacturers	ISO 22	ISO 32	ISO 22	ISO 32	ISO 22	ISO 32
Q8 [KUWAIT-PETROLEUM]		* Q8 HOLBEIN 32				
MOBIL		* EAL SYNDRAULIC 32		* EAL 224 H		BIOFLUID HLP 32
NUHN				** RT HY-DRAULIKÖL HVI 32		
OEST				BIOHYDRAU-LIKÖL HVI 34		
PANOLIN		HLP SYNTH 32				
RAISON TEHTAAT				* RT HYDRAU-LIKÖL		
SHELL				* NATURELLE HF 32		FLUID BD 32
VALVOLINE						
WENZEL & WEIDMANN				UKABIOL HY		UKADOL NG 32
TEXACO		RANDO BIO E				

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Base stock	ESTER		VEGETABLE RAPESEED		POLYGLYCOL	
	Viscosity at 40° C grade					
Manufacturers	ISO 46	ISO 68	ISO 46	ISO 68	ISO 46	ISO 68
ARAL					BAF 46	
AVIA	BIOHYD 46				HYDROSYNTH 46	
BECHEM					HYDROSTAR UWF 46	
BLASER	*BLASOL LP 8905					
BP	BIOHYD 46SE		* BIOHYD 46			
BUCHER MOTOREX						
CASTROL	ANVOL SW46				ANVOL PG46	
DEA	ECONA E46					
DELTIN			HYDRAU-LIKÖL HVI 46			
ELF	HYDRELF BIO 46					
ESSO	* UNIVIS BIO SHP 46				HYDRAU-LIKÖL PGK 46	
EWA [AUSTRIA]			BIOHYDRAU-LIKÖL 40			
FINKE						
FUCHS			PLANTOHYD 40		RENODIOL PGE 46	
FRAGOL					*HYDRAULIC TR 46	*HYDRAULIC TR 68

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	Viscosity at 40° C grade					
Manufacturers	ISO 46	ISO 68	ISO 46	ISO 68	ISO 46	ISO 68
Q8 [KUWAIT-PETROLEUM]	* EL 3484					
MOBIL	* EAL SYNDRAULIC 46				BIO FLUID HLP 46	
NUHN						
OEST						
PANOLIN	* HLP SYNTH 46					
RAISON TEHTAAT						
SHELL	* NATURELLE HFE 46				FLUID BD 46	
VALVOLINE			ULTRAPLANT 40			
WENZEL & WEIDMANN					* UKADOL NG 46	
TEXACO	RANDO BIO E		RANDO BIO R			