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Mr. L.J. Mew
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CONFIDENTIAL

AEG KANIS

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Ihre Zeichen und Nachricht vom

Unsere Zeichen
No/Un

Durchwahl-Nr.
-2326

Nürnberg
18 August 1986

Turbines for JUNCKERS
Our Com. No. 18933/934
Turbine Oil Approval

Dear Mr. Mew,

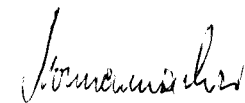
With reference to your letter dated 8 Aug 86 we give our approval for the product described on Product Data Sheet dealing with Code 11 (46) for the use in our turbines. We are returning your Product Data Sheet marked with our approval.

Furthermore, we attach our Standard Oil Specification for the Oil Viscosity ISO VG 46.

Yours sincerely,

Code 11: Q8 van Gogh

AEG KANIS GmbH
Steam Turbines Division
Instructions Manuals Department



Nonnenmacher

2 Enclosures:

- Product Data Sheet
- Oil Specification (AEG KANIS),
ISO VG 46

AEG KANIS GmbH

Vorsitzender des Aufsichtsrats: Walter Birkhan
Geschäftsführer: Dr. rer. pol. Walther Fleig,
Dipl.-Ing. Horst Kerlen

Sitz: Nürnberg
Amtsgericht Nürnberg HRB 945

Bankverbindungen:
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Deutsche Bank AG Nürnberg 0 110 700 (BLZ 760 700 12)
Bayer. Vereinsbank Nürnberg 2 221 780 (BLZ 760 200 70)



Kuwait Petroleum Research & Technology B.V.

Postbox 7045, 3000 HA Rotterdam, The Netherlands

Product Data Sheet

DATE 1986, February

CODE 11

APPLICATION: Steam- and gas-turbine circulation systems

FORMULATION:

- o Filtered Paraffinic Mineral Oils
- o Anti-oxidants
- o Rust Inhibitors
- o Anti-foam agents

SPECIFICATIONS:

- o ISO/DP 6743/5 Classification of Turbine Lubricants categories TSA-TSB-TGA-TGB
- o DIN 51515 turbine oil specification category L-TD

REFERENCES: Code 11 is officially approved by Brown Boveri & Cie, and Cooper Energy Services, ASEA-Stal and Hitachi. Further it meets the specifications for mineral steam- and gas-turbine oils of major turbine manufacturers which includes General Electric.

BENEFITS:

- o Long trouble free service
- o One product for steam- and gas-turbines
- o Quality exceeding Standard and turbine manufacturer requirements

CODE 11

Typical Data

	<u>32</u>	<u>46</u>	<u>68</u>
Abs. Density, D 1298, 15°C, kg/m ³	870	875	881
Kin. Viscosity, D 445 at 40°C, mm ² /s	32.0	46.0	68.0
Kin. Viscosity, D 445 at 100°C, mm ² /s	5.33	6.72	8.66
Viscosity Index, D 2270	98	98	98
Flash Point, D 92, °C	208	222	240
Pour Point, D 97, °C	- 12	- 12	- 12
Colour, D 1500	L 1.0	L 1.0	L 1.0
Copper Strip, D 130, 100°C, 3 h	1	1	1
Rust Test, D 665, 24 h			
Procedure A and B	pass	pass	pass
Total Acid Number, D 974, mg KOH/g	0.12	0.12	0.12
Aniline Point, D 611, °C	101	103	106
Emulsion, D 1401, distilled water at 54.4°C	40-40-0(5)	40-40-0(10)	40-40-0(10)
Air Release, DIN 51381, 50°C, min	3	3	4
Steam Emulsion, DIN 51589, s	below 60	below 60	below 60
Foam, D 892,			
5 min. blowing, seq. 1/2/3, ml	10/20/10	10/20/10	10/20/10
10 min. settling, seq. 1/2/3, ml	0/0/0	0/0/0	0/0/0
Oxidation, D 943,			
Time to 2.0 TAN, h	4000 ⁺	4000 ⁺	4000 ⁺

approved by ABG
10.8.86 *H. S. S. S.*

STANDARD SPECIFICATION FOR STEAM TURBINE OILS

The steam turbine oil used for the control oil system of the turbine and for the common lube oil system of the turbine, the gearing (if applicable) and the driven unit must be in accordance with the DIN 51515 Standards (May 1978) and have the following properties:

Designation	Requirements		Test Method
Oil type	TD 46		
ISO-class of viscosity	ISO VG 46		DIN 51519
Hitherto existing code number (correlation)	25		
Kinematic viscosity at 40°C			DIN 51550 in connection with DIN 51561 or DIN 51562
	min.	41.4	mm ² /s (cSt)
	max.	50.6	
Medium dynamic viscosity at 40°C	41.4x10 ⁻³		Pa s
Viscosity index not less	95		
Density at 15°C not above	0.90	kg/l	DIN 51757
Flash point (Cleveland) not less	185	°C	DIN 51376
Pourpoint equal or less than	-6	°C	DIN 51597
Neutralisation number not above ⁺)	0.1	mgKOH/g	DIN 51558 Part 1
Saponification number not above ⁺)	0.15	mgKOH/g	DIN 51559
Ash content (oxide ash) not above ⁺)	0.01	perc. by weight	
Water content g/100g	below the limit of quantitative detectability		DIN 51582
Content of solid substances g/100g	below the limit of quantitative detectability		DIN 51592
Demulsification number max.	300	sec.	DIN 51589 Part 1
De-airability (air release property) at 50°C max.	5	min.	DIN 51381
Corrosion influence on copper Corrosion degree max.	2-100 A3		DIN 51759 (3 h at 100°)

<u>Designation</u>	<u>Requirements</u>	<u>Test Method</u>
Corrosion protection property against steel	0-A (free of corrosion)	DIN 51585
Aging behaviour		
Rise of neutralisation number after 1,000 h max.	2.0 mgKOH/g oil	DIN 51587
Load carrying grade ⁺⁺	6-7	DIN 51354
ability FTG-		(A/8,3/90)
(Gear unit) Normaltest		ASTM D 1947-68
		IP 166/65

⁺) As additives are used, these values are higher and shall
stated by the makers.

Turbine oils with additive material shall meet higher requirements
concerning deterioration, corrosion and foaming.

Turbo-sets with highly stressed gear units might require a steam
turbine oil with EP-additives in order to raise the load carrying
ability. Reference is made to the gear unit lubricant instructions.

⁺⁺ not included in DIN 51515