Application Profile

DuPont™ Vespel® Rotating Equipment Reliability Technology

Vespel® CR-6100 Bearings for API (American Petroleum Institute) Separators

API Separator

The API separator is equipment typically found in oil refineries. It handles foul water from refinery process sewers and sends its to the treatment plant for processing. It also sends oil back to the coker or for other reprocessing. This service contains hydrocarbons, water, acids, particles, amines and ammonia.

Challenge

Sleeve bearings support series of 21 foot (6.4m) long shafts in the 4 inch (101.6mm) diameter range. Unit size determines the number of shafts and some units are hundreds of feet long. The bearings drive skimmers and are historically babbitt or bronze. Greased bushings fail due to corrosion and contamination. Nickle-graphite bushings wear and score the shafts..

Solution

DuPont™ Vespel® CR-6100 bearings increase performance and reliability and reduce failures to extend life and lower maintenance costs. Vespel® CR-6100 can operate without lubrication because of its low wear and low coefficient friction. The composite nature of Vespel® CR-6100 allows for less damage to the shaft at contact which extends the life of the equipment. In addition, its chemical resistance allows for operation in the most diverse aggressive services. pumps.

For technical support, material samples, or a machining guide, call
1-800-222-VESP (8377)
vespel.com

System Shafts

Bronze Bushing

Metal impregnated graphite
3.5 year service
0.5" (12.7mm)
Wear, shaft damage
Not serviceable

Vespel® CR-6100
3.5 year service
0.02" (0.51mm) Wear, no shaft damage
Serviceable

Comparative Wear Data

Material	Wear Rate (E-6)				Dynamic Coefficient of Friction		Limiting PV	
	25 ft./min. (0.13m/sec.)		50 ft./min. (0.25m/sec.)		25 ft./min. (0.13 m/sec.)	50 ft./min. (0.25 m/sec.)	English (psi-ft./min)	SI Units (MPa-m/sec.)
	in./hr.	cm/hr.	in./hr.	cm/hr.				
Vespel® CR-6100	27.1	68.8	74.4	189.0	0.20	0.29	>155,000	>5.4
Carbon Fiber/PFA	47.1	119.6	102.8	261.1	0.18	0.24	>92,000	>3.2
PEEK-Lubricated	70.7	179.6	149.2*	379.0	0.52	0.18	40,000	1.4
PAI-Lubricated, Wear-resistant	37.3	94.7	1,435.2*	3,645.4	0.33	0.21	64,000	2.2
Carbon Fiber/PEEK	85.2	216.4	–	–	0.29	–	–	–
Glass Fiber/PEEK	93.2	236.7	–	–	0.26	–	–	–
PEEK (Unfilled)	699.0	1,775.5	–	–	0.42	–	–	–

*Stick-slip,vibration.
Unlubricated pin on AISI carbon steel disc finished to 16 microinches (0.4 micrometers) (AA): 400 psi (8.9 MPa)

Broad Chemical Resistance*

Acids	Vespel® CR-6100	PEEK
Aqua Regia	A	C
Chromic Acid>50%	A	D
Chlorosulfonic Acid	A	D
Sulfuric Acid, 96%	A	D
Phosphoric Acid, 85%	A	B
Fluoboric Acid	A	D
Fluorosilicic Acid	A	D
Hydrofluosilicic Acid	A	D
Nitric Acid	A	D
Solvents		
Acetone	A	C
Ketones	A	C
Tetrahydrofuran	A	N/A
Methyl Acetone	A	C
Methyl Ethyl Ketone	A	C
Methyl Isobutyle Ketone	A	C
Dimethyl Sulfoxide	A	N/A
Oleum	A	D

Acids	Vespel® CR-6100	PEEK
Other		
Bromine	A	C
Sodium Hydroxide	A	C
Aq Zinc Chloride, 25%	A	N/A
Caustic Soda	A	C
Caustic potash	A	C
Chlorinated Water	A	D
Oxygen	A	D
Steam	A	A
Iodine	A	D
Oleum	A	D

Explanation of Ratings

A = Excellent, B = Good, C = Poor, D = Do not use

* Source: Chemical Resistance Guide for Plastics. Compass Publication

DuPont™ Vespel® CR-6100 parts and shapes are polymeric composite articles consisting of PFA/CF reinforced composite, 20% mass fraction random X-Y oriented carbon-fibre.

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