Information About Silicone Fluids

DOW CORNING

DESCRIPTION

DOW CORNING® 211 fluid is a heat-stabilized dimethyl polysiloxane fluid developed specifically for use in automotive fan clutches. The product features:

- Excellent high-temperature stability
- Controlled shear viscosity
- Minimal viscosity change when subjected to severe heat and shear stresses

USE

DOW CORNING 211 fluid is especially effective as a fluid coupling medium in automotive fan clutches. The fan clutch allows reduced fan speed at high engine speeds, such as during highway driving. Without it, fan noise levels are excessive. Also, some engine horsepower is required to pull the fan – resulting in reduced gas mileage and engine performance.

When the fan starts pulling a predetermined amount of air, the rotor in the fan clutch shears the silicone fluid. The action causes the fan to rotate at speeds no higher than those required for normal city driving.

As engine speeds are reduced, the silicone fluid picks up the rotor movement to maintain proper fan speed and ensure adequate cooling.

SOLUBILITY

Solubility of the silicone fluid in a number of commonly used solvents is indicated in the following lists.

DOW CORNING® 211 FLUID

Type	Dimethyl polysiloxane
Special Properties	Provides uniform performance under high shear rates over wide temperature ranges; high resistance to viscosity breakdown
Primary Use	Fluid coupling in automotive fan clutches

Solvents

Amyl acetate
Benzene
Carbon tetrachloride
Chlorothene[1]
Cyclohexane
Diesel fuel
Ethylene dichloride
Ethyl ether
2-Ethylhexanol
Gasoline
Hexyl ether
Isooctane
JP-4 jet fuel
Kerosene
Methyl ethyl ketone
Methylene chloride
Methyl ether
Mineral seal oil
Naphtha VM&P
Perchloroethylene
Stoddard solvent
Toluene
Trichloroethylene
Turpentine
Xylene

TYPICAL PROPERTIES

These values are not intended for use in preparing specifications.

	Color	Pale yellow to gray
CTM 0006*	Flash Point, open cup, °C (°F)	304 (580)
CTM 0001	Specific Gravity, at 25 C (77 F)	0.97
CTM 0002	Refractive Index, at 25 C (77 F)	1.4040
CTM 0004	Viscosity, at 25 C (77 F), centistokes	±5% of viscosity grade
	Viscosity-Temperature Coefficient†	0.6
CTM 0001	Coefficient of Expansion, cc/cc/°F	5.3×10^{-4}
CTM 133	Pour Point, °C (°F)	-46 (-50)

*Dow Corning Corporate Test Method. Method available on request.

† $1 - \frac{\text{viscosity at 99 C (210 F)}}{\text{viscosity at 25 C (100 F)}}$

Specification Writers: Please contact Dow Corning Corporation, Midland, Michigan, before writing specifications on this product.

[1]Registered trademark of The Dow Chemical Company.

MSDS INFORMATION

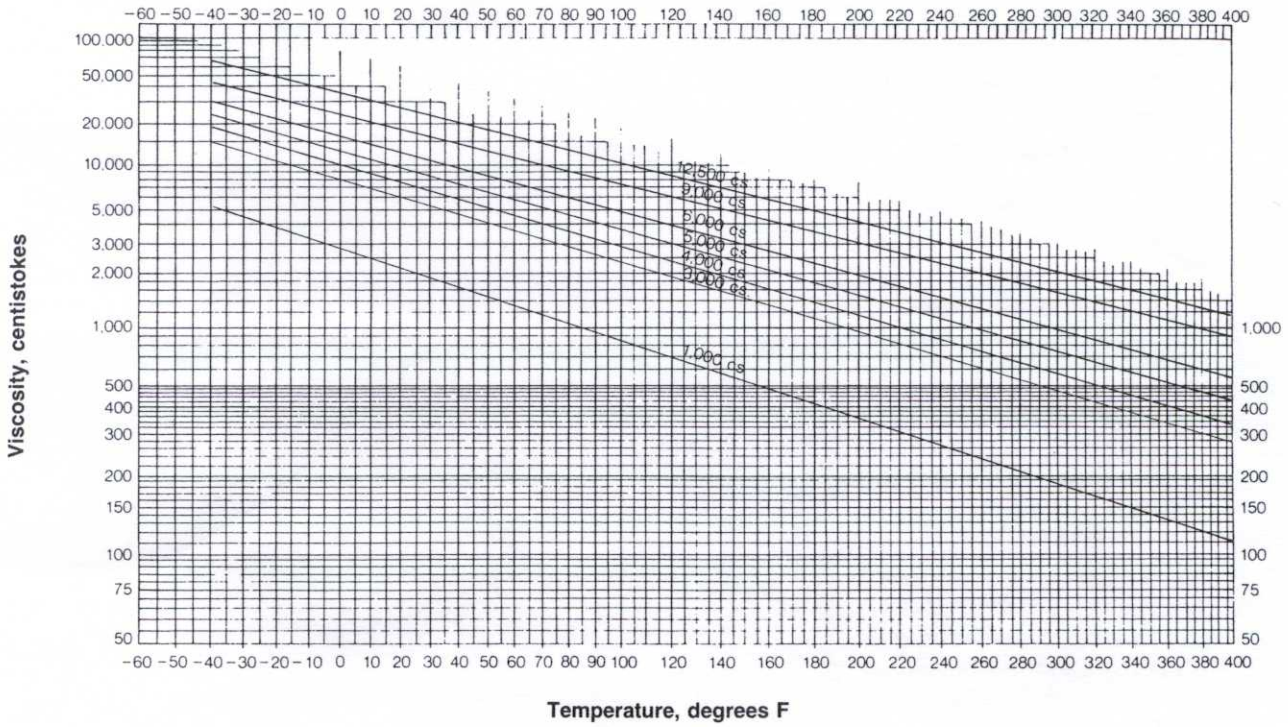
ATTENTION: PRODUCT SAFETY INFORMATION REQUIRED FOR SAFE USE IS NOT INCLUDED. BEFORE HANDLING, READ PRODUCT AND MATERIAL SAFETY DATA SHEETS AND CONTAINER LABELS FOR SAFE USE, PHYSICAL AND HEALTH HAZARD INFORMATION. THE MATERIAL SAFETY DATA SHEET IS AVAILABLE FROM YOUR DOW CORNING REPRESENTATIVE, OR DISTRIBUTOR, OR BY WRITING TO DOW CORNING CUSTOMER SERVICE, OR BY CALLING 1-517-496-6000.

FIGURE 2: TYPICAL SHEAR VISCOSITY

These values are not intended for use in preparing specifications.

Viscosity, at 25 C (77 F)	*Apparent Viscosity, at 5025 sec⁻¹ (cs)*			*Apparent Viscosity, at 10,620 sec⁻¹ (cs)*		
	Min.	*Nom.*	*Max.*	*Min.*	*Nom.*	*Max.*
1000	—	—	—	—	—	—
3000	2182	2424	2656	1819	2021	2223
4000	2659	2955	3251	2172	2413	2654
5000	3127	3475	3823	2520	2800	3089
6000	3525	3917	4309	2709	3100	3410
9000	4550	5275	6000	3450	3850	4250
12,500	4900	—	—	3600	—	—

FIGURE 3: VISCOSITY VS. TEMPERATURE



Partial Solvents[2]

Acetone
Butanol
Dioxane
Ethanol
Heptadecanol
Isopropanol

Nonsolvents

Cyclohexanol
Dimethyl phthalate
Dodecanol
Dowanol[1] DE
Ethylene glycol
Methanol
Paraffin oil
Propylene glycol
Water

HOW TO USE

Sealing Recommendations

The most universally successful elastomeric sealing material for DOW CORNING 211 fluid is SILASTIC® brand fluorosilicone rubber, which will retain physical stability over the full operating temperature range of the fluid. Seals of standard construction such as O-rings are suitable.

Viton[3], Teflon[3], and Kel-F[4] fluorocarbon materials are also excellent sealing materials for DOW CORNING 211 fluid if low-temperature service is not a requirement.

If service temperatures will not go much below -18 C (0 F) or above 121 C (250 F), organic rubber seals can be used. However, rubber formulations containing plasticizers that will leach into the fluid should be avoided. Leaching of the plasticizer will alter the properties of the rubber and contaminate the fluid.

Conventional silicone rubber will swell in the presence of DOW CORNING 211 fluid. This property can be used to advantage if the seal is in a confined space.

Blending

Although the fluid is available in a number of standard viscosity grades, occasionally an application will call for a fluid viscosity between those of the standard grades. Blending different viscosity grades of DOW CORNING 211 fluid permits any desired viscosity. (See Figure 1.)

To use the chart:

1. Draw a line between the two points: one on the left-hand scale (representing the high viscosity fluid available) and one on the right (representing the lower viscosity fluid).

2. Draw another line horizontally across the chart at the desired viscosity rating.

3. Draw a third line vertically through the intersection of the first two lines.

4. Read the top and bottom scales for blending proportions to obtain the desired viscosity.

Accuracy will be increased by blending the two fluids with viscosities that most closely bracket the desired viscosity. If a very accurate blend is required, the viscosity of the mixture may have to be adjusted using a second blending.

EXAMPLE – A 7000-cs fluid is desired, and 12,500-cs fluid is blended with 4000-cs fluid. Thus, a line is drawn from 12,500 on the left to 4000 on the right (line A), and a horizontal line (B) is drawn at 7000. The intersection point (AB) gives the proportions needed – in this case, 40 percent of 12,500-cs fluid and 60 percent of 4000-cs fluid.

SHIPPING LIMITATIONS

None.

STORAGE AND SHELF LIFE

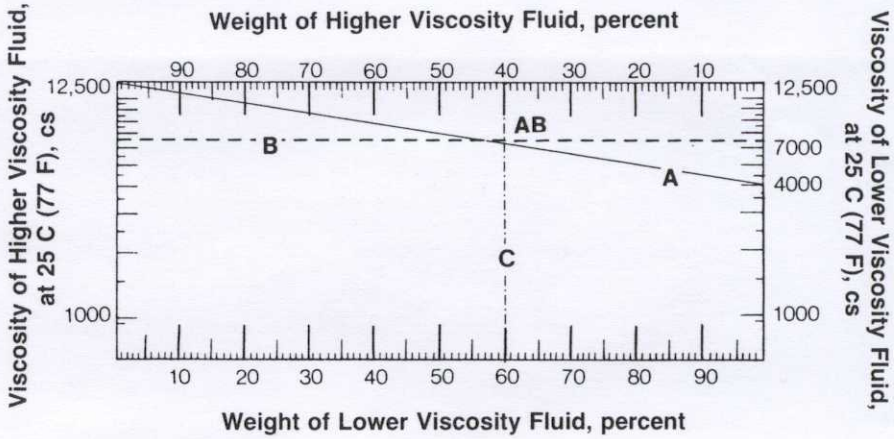
When stored at or below 32 C (90 F), DOW CORNING 211 fluid has a shelf life of 12 months from date of shipment.

PACKAGING

DOW CORNING 211 fluid is supplied in 40- and 440-lb (18.1- and 199.6-kg) containers, net weight.

FIGURE 1: BLENDING CHART

Obtain an intermediate viscosity by blending standard viscosity grades.



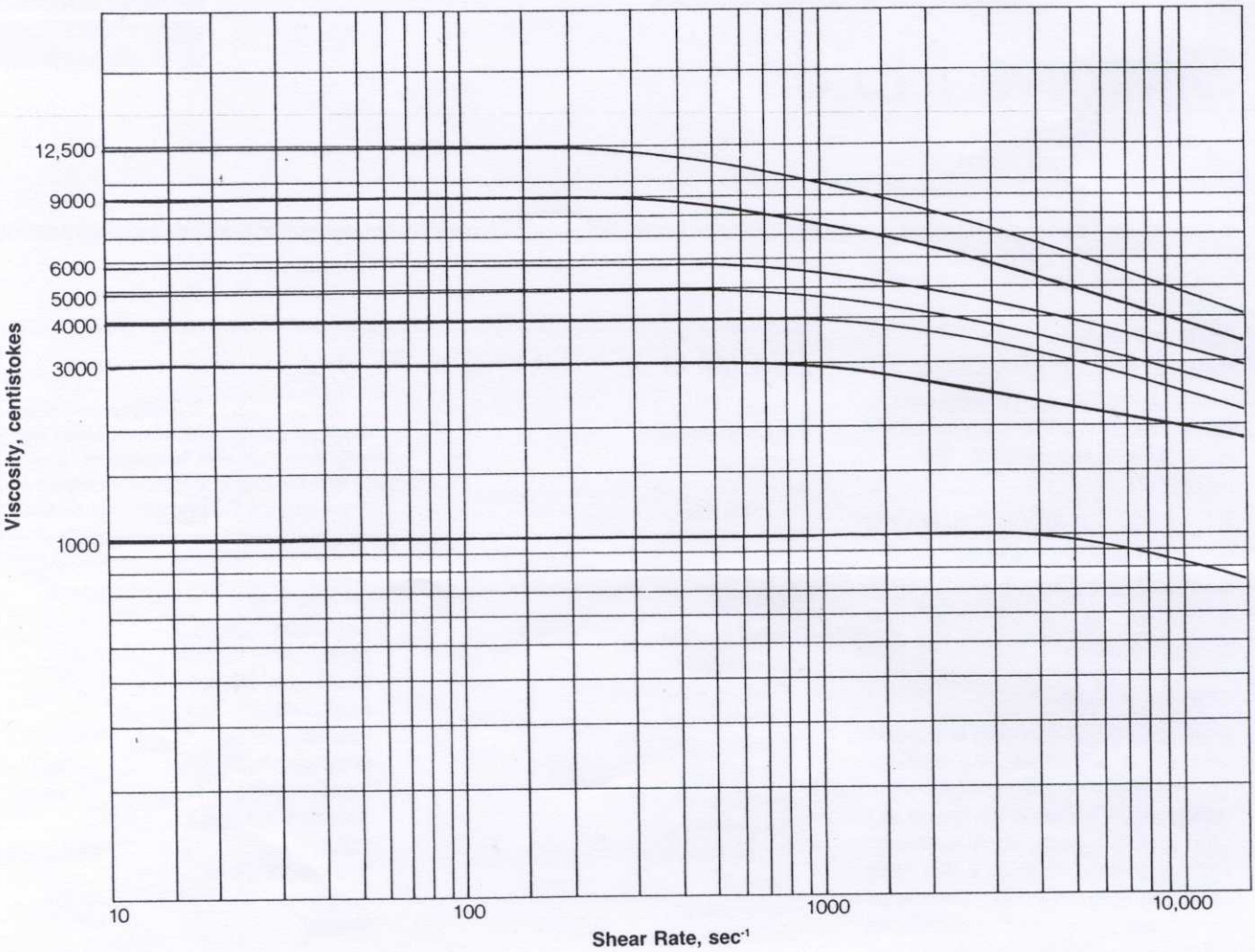
[1]Registered trademark of The Dow Chemical Company.

[2]Partial solvents – for lower viscosity grades.

[3]Trademark of E. I. du Pont de Nemours & Co.

[4]Trademark of 3M Company.

FIGURE 4: APPARENT VISCOSITY VS. SHEAR RATE FOR DOW CORNING 211 FLUID
(Capillary Viscometer Data)



WARRANTY INFORMATION – PLEASE READ CAREFULLY

Dow Corning believes that the information in this publication is an accurate description of the typical characteristics and/or uses of the product or products, but it is your responsibility to thoroughly test the product in your specific application to determine its performance, efficacy and safety.

Unless Dow Corning provides you with a specific written warranty of fitness for a particular use, Dow Corning's sole warranty is that the product or products will meet Dow Corning's then current sales specifications. **DOW CORNING SPECIFICALLY DISCLAIMS ANY OTHER EXPRESS OR IMPLIED WARRANTY, INCLUDING THE WARRANTIES OF MERCHANT-ABILITY AND OF FITNESS FOR USE.** Your exclusive remedy and Dow Corning's sole liability for breach of warranty is limited to refund of the purchase price or replacement of any product shown to be other than as warranted, and Dow Corning expressly disclaims any liability for incidental or consequential damages.

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