BD 0945
Performance Summary
EPA REGISTRATION NUMBER
217620001
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Carburetor
Deposit Control Performance
BD 0945
Carburetor Keep-Clean

Renault R5
(CEC F-03-T-81)

Carburetor Deposits
8 min Rating = Pass

Merit 10 = Clean

BD 0945, 25 ptb

9.43
BD 0945
Port Fuel Injector (PFI)
Keep-Clean Performance
BD 0945

PFI Keep-Clean Performance

- Chrysler 2.2L Turbo
- Treat Rate = 25 ptb
- Test Fuel - Severe RUL:
  - T₉₀ - 320°F
  - Sulfur - 115 ppm
  - Olefins - 18 vol%
  - Aromatics - 26 vol%

![Graph showing percent clean injector flow over miles for different cylinders with CARB/EPA minimum flow at 10,000 miles.](chart.png)
- Chrysler 2.2L Turbo
- Treat Rate = 31 PTB
- Test Fuel Properties:
  - T90 - 342 F
  - Sulfur - 370 ppm
  - Olefins - 11.5 vol%
  - Aromatics - 31.1 vol%
  - Ethanol - 10 vol%
BD 0945
Port Fuel Injector (PFI) Cleanup Performance
**BD 0945**

**PFI Cleanup Performance**

- **Chrysler 2.2L Turbo**
- **Treat Rate = 31.5 ptb**
- **Test Fuel - Severe RUL:**
  - $T_{90}$ - 341°F
  - Sulfur - 410 ppm
  - Olefins – 11.3 vol%
  - Aromatics – 35.2 vol%

![Graph showing percent clean injector flow](image-url)
**BD 0945**

**PFI Cleanup Performance**

- **Chrysler 2.2L Turbo**
- **Treat Rate = 33 ptb**
- **Test Fuel - Severe RUL:**
  - $T_{90} - 327^\circ F$
  - Sulfur - 115 ppm
  - Olefins - 10.2 vol% 
  - Aromatics - 40 vol%
**BD 0945**

**PFI Cleanup Performance**

- **Chrysler 2.2L Turbo**
- **Treat Rate = 47 ptb**
- **Test Fuel - Severe RUL:**
  - $T_{90} - 327^\circ F$
  - Sulfur - 115 ppm
  - Olefins - 10.2 vol%
  - Aromatics - 40 vol%

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*CARB/EPA Minimum Flow (Any Injector at 10,000 Miles)*
BD 0945

Intake Valve Deposit ( IVD )
Keep-Clean Performance
BMW Test SwRI

ASTM D5500 Procedure

Treat Rate = 25 ptb

Test Fuel Properties:
- T90 - 349 F
- Sulfur - 504 ppmw
- Olefins – 16.3 vol%
- Aromatics – 33.0 vol%
- Ethanol - 10 vol%

Intake Valve Deposit Mass, mg

Maximum Average IVD for EPA
BMW Test SwRI

ASTM D5500 Procedure

Treat Rate = 33.2 ptb

Test Fuel Properties:
- T90 - 343.7°F
- Sulfur - 520 ppmw
- Olefins - 12.0 vol%
- Aromatics - 34.7 vol%
- Ethanol - 10 vol%

Intake Valve Deposit Mass, mg

Max. Avg. IVD for Unlimited Pass

BD 0945
IVD Keep-Clean
BD 0945
IVD Keep-Clean

1.8L BMW Lab Engine
Intake Valve Deposits
35 hours, FR 23500

![Graph showing intake valve deposits for different fuel types and valve numbers.](graph.png)
BD 0945
IVD Keep-Clean

1.6L Toyota Lab Engine
Intake Valve Deposits
96 hours, FR 23500
BD 0945
IVD Keep-Clean
SwRI 2.3L Ford Results
Intake Valve Deposits
100 hours, GA 486

Graph showing intake valve deposits for different fuels over 100 hours of operation.
BD 0945

Intake Valve Deposit (IVD)

Cleanup Performance
BD 0945
IVD Cleanup
1995 Toyota Corolla 1.6L DOHC 4
5,000 Mile Dirty Up of As Is Rental Vehicles
Followed by 5,000 Mile Clean Up

![Graph showing IVD cleanup results for 1995 Toyota Corolla 1.6L DOHC 4.]
BD 0945
IVD Cleanup

1995 Buick Century 3.1L V-6
5,000 Mile Dirty Up of As Is Rental Vehicles
Followed by 5,000 Mile Clean Up

![Graph showing IVD cleanup percentages for different valve positions. The graph has a legend indicating different valve positions (1-6) and an average line. The x-axis represents DU Base Fuel, 82 ptb, and BD, while the y-axis represents IVD Mass, mg. The graph highlights a 66% reduction in IVD mass after BD 0945.]
BD 0945
IVD Cleanup

SDYC Test 105 - 10,000 Mile Clean Up Test
1996 Dodge Intrepid (3.3L V-6 PFI Engine)
Intake Valve Deposit (4-Cab Average)
BD 0945

Combustion Chamber Deposit (CCD)
No-Harm Performance
BD 0945
CCD Performance

SDYC Test 105 - 10,000 Mile Clean Up Test
1996 Dodge Intrepid (3.3L V-6 PFI Engine)
Total CCD Thickness (4-Cab Average)

<table>
<thead>
<tr>
<th>Cab</th>
<th>Total CCD Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cab 1</td>
<td>0.000</td>
</tr>
<tr>
<td>Cab 2</td>
<td>0.100</td>
</tr>
<tr>
<td>Cab 3</td>
<td>0.200</td>
</tr>
<tr>
<td>Cab 4</td>
<td>0.300</td>
</tr>
<tr>
<td>Cab 5</td>
<td>0.400</td>
</tr>
<tr>
<td>5-Cab Avg</td>
<td>0.500</td>
</tr>
</tbody>
</table>

- 1996 Dodge Intrepid (3.3L V-6 PFI Engine)
- Total CCD Thickness (4-Cab Average)

Mkt Leader's Commercial Gasoline
- 100.5 ptb
- Dc 2870+
- 80 ppm POPA

20K mile DU
10K mile CU

Average
- Cab 1
- Cab 2
- Cab 3
- Cab 4
- Cab 5
BD 0945
CCD Performance
1.8L BMW Engine Stand

CCD - 35 hours
Base Fuel - Commercial regular gasoline

The diagram shows the comparison of CCD performance between base fuel and 88 ptb BD 0945. The data is presented for each cylinder (Cyl #1 to Cyl #4) and includes measurements for both the head and piston sections of the engine. The graph illustrates the difference in CCD performance metrics across the cylinders for both fuel types.
BD 0945

No-Harm Testing
OVI, Sludge and Varnish Tests
- Severe 22,500 Mile Field Test with 10,000 mile oil changes
- GM 3.8L V-6 PFI Vehicles
- Ford 4.6L V-8 PFI Vehicles
- San Diego Yellow Cab Service
- Test Fuel: CaRFG
- No Harmful Effects Observed

Bearing Wear/Corrosion
- No-Harm Performance of Package Components Previously Confirmed in L-38 Bench Tests and Taxicab Field Tests
BD 0945
Valve Stick Performance

VW Wasserboxer Valve Sticking Test

- VW Wasserboxer Valve Sticking Engine Test Method
  - CEC F-16-X-95
  - Test Temperature: +5°C
- BD 0945 @ 4.5x Recommended Additive Treat Level
- VW Wasserboxer Results
  - 0% Valve Sticking
- Test additive had reduced carrier oil concentration, which increased the severity of the test.
Performance Summary
Provides Excellent PFI Keep-Clean and Cleanup Performance

Provides Excellent IVD Deposit Control Performance
  - IVD Keep-Clean and Cleanup Performance Demonstration in Several Engine/Vehicle Types

Helps Minimize Combustion Chamber Deposits
  - Equal/Better CCD vs Commercial Mineral/PBA Packages

Extensive No-Harm Testing Completed
  - No Detrimental Side Effects.
BD 0945
Performance Summary

- Provides Excellent Corrosion Protection
- Excellent Handling Characteristics
- Based on Patented Technology
- Recommended Treat Rates for Aftermarket Applications Range from 121 ppm (31.5 ptb) to 570 ppm (149 ptb) of BD 0945