

Black Coat

STAINLESS STEEL



- Available Utilizing Type 409, Type 439, AK Steel 439 LT, Aluminized Type 409 and Type 439 Black Coat and AK Steel 18 Cr-Cb Stainless Steel Substrates

Applications Potential

The AK Steel Black Coat™ system is a multi-layer surface coating continuously applied to stainless steel coils. AK Steel Black Coat Stainless Steels are available utilizing a variety of substrate materials tailored to your particular application.

This includes such popular exhaust alloys as Type 409, Type 439, AK Steel 439 LT and AK Steel 18 Cr-Cb. The Black Coat coating system applied to these alloys results in highly effective automotive exhaust products, especially useful for applications requiring good cosmetic appearance at high temperatures. Due to the special nature of the Black Coat system, enhanced formability compared to bare stainless alloys is usually achieved. These materials are particularly useful for applications involving the cold end of exhaust systems such as mufflers and tail pipes.

Table of Contents

	Page
Applications Potential	1
Product Description	3
Key Features	3
Available Forms	3
Metric Practice	3
Cosmetic Corrosion Resistance	4
Adhesion	5
Gravelometer	5
Perforation Corrosion Resistance	6
Cosmetic Corrosion Resistance	7
Weldability	7

The information and data in this product data bulletin are accurate to the best of our knowledge and belief, but are intended for general information only. Applications suggested for the materials are described only to help readers make their own evaluations and decisions, and are neither guarantees nor to be construed as express or implied warranties of suitability for these or other applications.

Data referring to mechanical properties and chemical analyses are the result of tests performed on specimens obtained from specific locations of the products in accordance with prescribed sampling procedures; any warranty thereof is limited to the values obtained at such locations and by such procedures. There is no warranty with respect to values of the materials at other locations.

AK Steel and the AK Steel logo are registered trademarks of AK Steel Corporation.

Black Coat and 18 Cr-Cb are trademarks of AK Steel Corporation.

PRODUCT DESCRIPTION

AK Steel Black Coat is a multi-layer surface coating system applied to cleaned stainless steel coils. The typical coating thickness is between 0.9 and 1.1 mil.

Key Features

- The Black Coat system can withstand temperatures up to 1000°F (538°C) for short duration and 650°F (343°C) for long durations.
- Excellent coating uniformity and quality is assured through careful application of the system to the coil.
- The Black Coat stainless system does not require external lubricant during forming operations.
- The coating system meets stringent cosmetic corrosion specifications while providing good perforation corrosion resistance.

Figure 1



Available Forms

AK Steel can supply coils of Black Coat Type 409, Type 439, AK Steel 439 LT, Aluminized Type 409 and Type 439 and AK Steel 18 Cr-Cb Stainless Steels in thicknesses from 0.018" to 0.065" (0.457 to 1.65 mm). Widths up to and including 48" (1219 mm) are available. Inquire for other grades.

Metric Practice

The values shown in this bulletin were established in U.S. customary units. The metric equivalents of U.S. customary units shown may be approximate. Conversion to the metric system, known as the International System of Units (SI) has been accomplished in accordance with ASTM E380.

Cosmetic Corrosion Resistance

Neutral Salt Spray Resistance

Coated panels of 6" x 4" (152.4 x 101.6 mm) were exposed to neutral salt spray for one week. Both Black Coat 409 and Black Coat 439 LT showed 0% red rust.

Figure 2

Thermal Cycle Test + Salt Spray Test



GM Standard 9984299

Test panels were baked at 842°F (450°C) for 30 minutes, then quenched in water <41°F (5°C). This thermal cycle was repeated five times, followed by exposure of the samples to neutral salt spray for one week. Black Coat 409 showed <2% rust and Black Coat 439 LT showed 0% red rust.

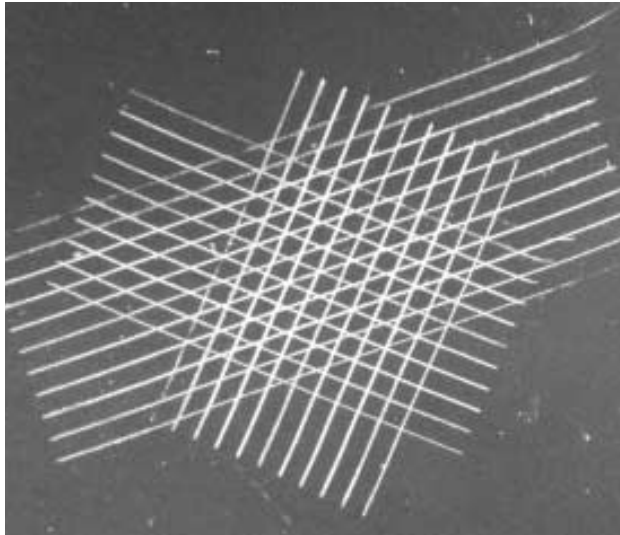
Ford Specification WSA-M2P170-A2

Painted panels were cycled at 842°F (450°C) for 15 minutes, then quenched in water <38°F (3°C). The panels were then exposed to neutral salt spray for 240 hours. Black Coat 409 showed <2% rust and Black Coat 439 LT showed 0% red rust.

Adhesion

Figure 3

Humidity Exposure



Coated panels were scribed and subsequently exposed to humidity.

No paint was removed after tape adhesion tests.

GM Standard 4465P

Coated panels of 6" x 4" (152.4 x 101.6 mm) were exposed to 96 hours of condensing 101°F (38°C) humidity. There was no coating removal on Black Coat 409.

Ford Specification FLTM BI 106-01, Method B

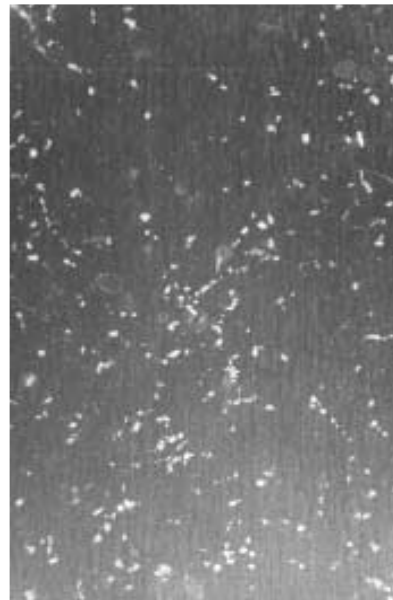
Coated panels of 6" x 4" (152.4 x 101.6 mm) were exposed to 48 hours of 50% RH at 77°F (25°C). There was no coating removal on Black Coat 409.

Gravelometer

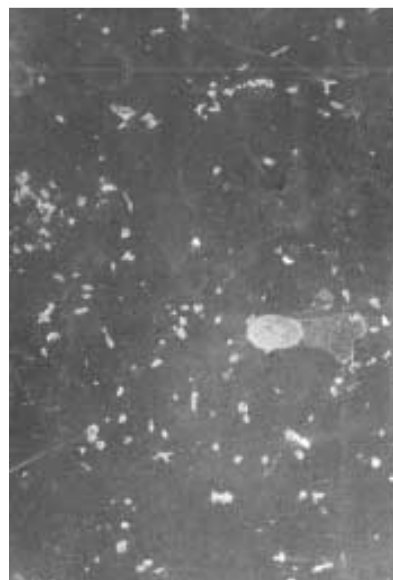
6" x 4" (152.4 x 101.6 mm) coated panels were exposed to a Gravelometer test (SAE J400) in the as-coated condition and to a thermal cycle test (as per GM 9984299). In addition, panels were exposed to neutral salt spray for 1 week after the thermal cycle. Though chip marks were evident after the Gravelometer test, they were superficial and did not penetrate the coating to the base metal.

Figure 4

Gravelometer test on Black Coat 409



After Thermal Cycles



Thermal Cycle + SST

Perforation Corrosion Resistance

Cold End Cycle Test A

Panels were exposed to the following conditions:

Heat Cycle:

- 500°F (260°C) for one hour once every week.

Six-Hour Corrosion Cycle:

- 15 minute immersion in salt solution.
- drying for 20 minutes at 104°F (40°C) and 35% RH.
- 5 hours and 25 minutes of humidity exposure at 140°F (60°C) and 85% RH.

Cold End Cycle Test B

Panels were exposed to the following conditions:

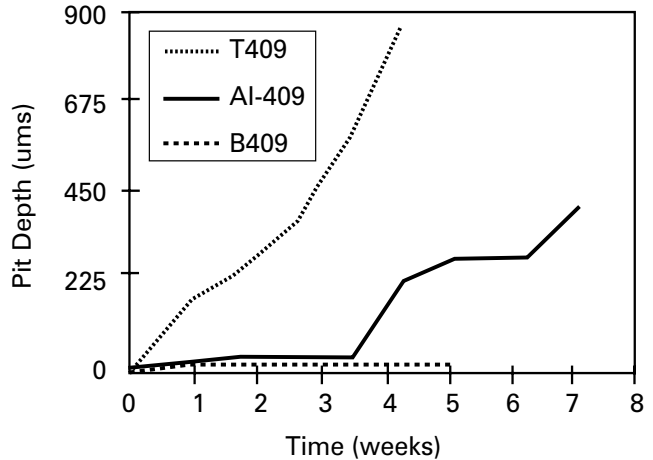
Heat Cycle:

- 500°F (260°C) for one hour five times per week.

Six-Hour Corrosion Cycle:

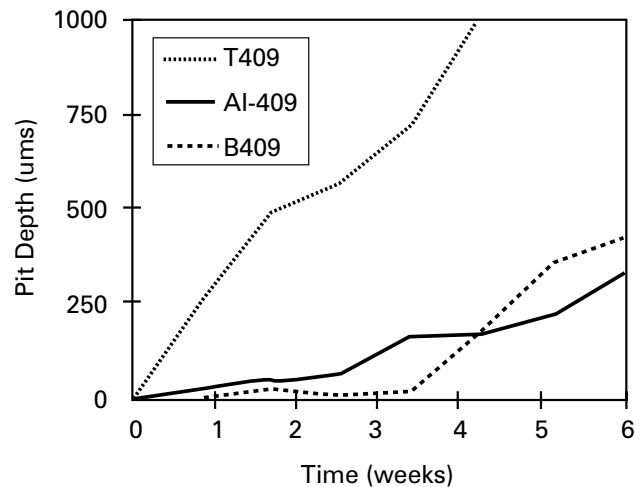
- 15 minute immersion in salt solution.
- drying for 20 minutes at 104°F (40°C) and 35% RH.
- 5 hours and 25 minutes of humidity exposure at 140°F (60°C) and 85% RH.

Figure 5



Pit depth vs time for Type 409, Aluminized 409 (Al409) and Black Coat 409 (B409) in cycle test A. Tests indicate the coating acts as an effective barrier to the initiation of pits.

Figure 6



Pit depth vs time for Type 409, Aluminized 409 (Al409) and Black Coat 409 (B409) in cycle test B.

Cosmetic Corrosion Resistance

Swift Cup – Heat/Salt Spray Resistance

Black Coat panels of 4" x 4" (101.6 x 101.6 mm) material were formed into cups and thermally cycled at 842°F (450°C) for 30 minutes followed by water quenching at <41°F (<5°C). The cups were then exposed to a neutral salt spray for one week (GM Standard 9984299, June 1997). Black Coat 409 showed <2% rust and Black Coat 439 LT showed 0% red rust.

Figure 7

Black Coat 409 exposed to one week of salt fog after thermal cycle.

Swift cup 0.035" (.889 mm) gage height = 1" (25.4 mm)



Weldability



MIG Welding

MIG welding of bare tail pipes to painted end caps has been accomplished successfully. The weld characteristics are similar to bare metal — bare metal welds.

High-Frequency and Laser Welding

Black Coat Stainless Steels can be welded by conventional HF and laser tube mills with excellent results.

Spot Welding

Preliminary results show that resistance welding of Black Coat panels is difficult due to the insulative nature of the coating system.

Note: All welding on coated materials of this nature generates some degree of fume emission, so proper ventilation is recommended.



Customer Service 800-331-5050

AK Steel Corporation
9227 Centre Pointe Drive
West Chester, OH 45069

www.aksteel.com

