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TECHNICAL BULLETIN

Black Satin Header Coating Dramatically Reduces Radiated Heat.

Competition Cams of Memphis Tenn., performed a series of tests to determine the amount of radiated heat reduced by the application of "Black Satin" header coating. The following information describes the test method, goals and the results.

METHOD: A 468 Cu.In. big block Chevy engine was selected for testing. Competition Cams technicians coated one tube steel exhaust header while the other was left uncoated. One temperature probe was fixed into each header to measure exhaust gas temperatures (EGT), one probe was placed on the surface of each header to measure surface (ST) and one probe was located 1" away from the surface of each header to measure the amount of heat radiated from the surface (RH). These last probes were placed directly above the hottest portion of the headers. Multiple dyno runs would be performed. A short warm up period would precede each dyno run. By testing on a dyno we could measure the effectiveness under full load conditions, when temperatures would be highest.

GOAL: The goal would be to achieve a significant reduction in the amount of heat that would be measured by the probe located 1" away from the surface of the coated header as compared to the uncoated header. A significant reduction in radiated heat would translate into a more efficient exhaust as well as reducing under hood temperatures. This change in RT would potentially lead to greater performance with reduced thermal stress on surrounding components and a potential reduction in carburetor air inlet temperature. Ambient temperature was 60F.

RESULTS: The results were beyond expectation! The highest reading recorded by the probe located 1" above the surface was only 80 degrees F! The maximum EGT was over 1500 F on both headers and the maximum ST was over 900f (on the uncoated header). By comparison the uncoated header was showing a RH of 200 F, 1" from the surface. During most for the test the thermal barrier effectiveness was greater than 90%. Below are a few of the data lines developed during the test.

EGT	ST	RH (uncoated)	RH (coated)
1330	810	170	60
1340	810	170	60
1350	820	170	60
1380	830	180	70
1410	840	180	70
1420	840	180	70
1440	860	190	70
1510	890	190	70
1430	930	200	80

ROOM TEMPERATURE WAS 60F

This was the data generated by test #14. The maximum RH measured on the coated header in test #13 was 70 F. These two tests alone covered a period of approximately 20 minutes. Yet at the beginning of test #14, while the uncoated pipe immediately registered a RH of 170 F, the coated pipe was still showing a RH of 60 F, which was room temperature! There was no temperature rise at 1" on the uncoated header during the initial engine running time prior to the dyno pulls.

CONCLUSION: The use of Black Satin will dramatically reduce radiated heat. This would reduce the potential for damage suffered by components that are located close to the surface of the exhaust. In addition total power can increase. First of all by maintaining more heat in the exhaust, exhaust gas velocity is maintained at a higher level than with an uncoated exhaust. Typically this can lead to H.P. gains of from 3 to 15 H.P. In addition by reducing carburetor air inlet temperature additional power will be gained. In a real world application where environmental temperatures are not controlled, as in a dyno cell, a 10 degree F drop in inlet temperature can equal a 1% gain in engine H.P. If we use the above data and assume that the inlet temperature only dropped by ½ of the reduction in RH over the uncoated header we would still see a significant power increase. A 60 degree F drop would generate a 6% increase in power. This engine produced a maximum of 563 H.P. The drop in inlet temperature would potentially show as an increase of 31 H.P.

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