Australian spark arrester tests: spark arrester for International B-250

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FORMAL tests on spark arresters are conducted by The Tractor Testing Committee* at the Testing Station, Werribee, on behalf of those companies concerned with tractors, engines or spark arresters who wish to have these equipments tested. The arrester is tested on the engine it is specially designed for (as in this instance), or if it is sold for use on any or several engines, it is tested on an engine of the highest power for which the spark arrester is intended.

1.—Test Procedure.

The method of test is based on a procedure standardised by the Society of Automotive Engineers (U.S.A.). This consists of feeding a weighed quantity of carbon particles of given size into the exhaust of the working engine, and then catching in a trap, and weighing, the particles that the arrester allows to pass through. Separate runs are conducted with particles of larger and smaller size; in some runs the engine is working at full load, in others at fast idle under no load.

According to the S.A.E. standard, no particles of the larger size should escape the arrester, and not more than 10 per cent, of the smaller size. At the same time the extra back pressure imposed on the exhaust system by the presence of the arrester should be no more than 10 inches in a water barometer.

2.—Name and Type of Arrester: “B-250”.

Submitted by: International Harvester Co. of Australia Pty. Ltd., Geelong, Victoria.

For Particular Tractor: International B-250 Diesel.

3.—Brief Specification of Arrester.

Operating Principle: Perforated screen.
Declared Maximum Horse-Power: Not stated.
Dimensions: Exhaust pipe, diameter 2 inches. Tail pipe, diameter 2 inches; length 5 inches. Arrester, outside diameter 5\(\frac{1}{4}\) inches; length 9\(\frac{1}{2}\) inches; weight 6 lb.
Materials: Mainly 16-gauge steel.
Screen, 26-gauge perforated, stainless steel.
Mounting: Vertical, ahead of operator, effluent upwards.

Details of Test Engine: International B-250 (Tractor). 27 horse-power maximum; 140 cubic inches; rated speed, 1,800 r.p.m.

4.—Summary of Test Results.

(Particles injected at rate of 100 gms. in 18-20 minutes.)

(a) Effectiveness of Spark Arresting:

<table>
<thead>
<tr>
<th>Particle Size</th>
<th>Engine Load Condition</th>
<th>Carbon Passing Arrester (Percentage)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large</td>
<td>High</td>
<td>0.0</td>
<td>Two tests</td>
</tr>
<tr>
<td>Large</td>
<td>Low</td>
<td>10.0</td>
<td>Two tests</td>
</tr>
<tr>
<td>Small</td>
<td>High</td>
<td>4.0</td>
<td>Average of two tests</td>
</tr>
<tr>
<td>Small</td>
<td>Low</td>
<td>1.0</td>
<td>Average of two tests</td>
</tr>
</tbody>
</table>
5.—Comment.

Risk of Bad Fitting through Damage: The two sheet-metal ends fit over the sheet-metal shell; if the fitting at the lower (inlet) end is imperfect, e.g., through denting by damage then un-screened carbon particles could escape.

Screen Openings and Material: The screen consists of perforated 26-gauge stainless-steel sheet, approximately 150 holes per square inch, the holes being 0.039 inches diameter (slightly bigger than the "small carbon" size). On inspection after the tests it was found that a proportion of the holes—roughly 5 to 10 per cent.—were blocked up with particles which were difficult to remove.

There were indications that this accumulation of carbon had been burned off during high-load runs. It is understood that reliance is placed on this burning-off from time to time, in order to keep the screen clear. Nevertheless, overseas tests suggest that burning of this kind leads to rapid failure of screens unless made of nickel-chromium alloys.

Compared with iron-wire screens, the use of stainless steel in the form of perforated sheet would be expected to give a longer life.

Prospective Life: It is impossible to estimate the probable life of the screen; it is, however, easily replaced, and the makers expect it to be regularly inspected, and, if necessary, be renewed each season.

Subsequent tests for 1,000 hours at full load, reported by the applicant company suggest that the stainless-steel screen is virtually unimpaired after such service, and that it is likely to outlast the shell.

NOTE.—This report makes no promise about the likely performance of the arrester other than in the condition supplied for test, i.e., new.

University of Melbourne, 13th December, 1957.

W. F. BAIIIE,
Testing Officer.

G. H. VASEY,
Officer in Charge,
Tractor Testing.