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Australian spark arrester tests

Department of Agriculture, Western Australia

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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 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.
   "AW-7" (I.H.C. Part No. 843846R91).
   Submitted by: International Harvester Co. of Australia Pty. Ltd., Geelong, Victoria.
   For Particular Tractor: International AW-7 Diesel.

   Operating Principle: Perforated screen.
   Declared Maximum Horse-Power: Not stated (nominally 50 shaft h.p.).
   Dimensions: Exhaust pipe: dia.—2\(\frac{3}{8}\)"; Tail pipe: dia.—2\(\frac{1}{8}\)", length—5\(\frac{1}{2}\)". Arrester: outside dia.—5\(\frac{1}{2}\)", length—9\(\frac{1}{2}\)", weight—6\(\frac{1}{2}\) lb.
   Mounting: Vertical, ahead of operator, effluent upwards.
   Details of Test Engine: International AW-7 Tractor. 4-cyl. diesel 47 belt horse-power maximum; 264 cubic inches; rated speed, 1,450 r.p.m.

4. Summary of Test Results.
   (Particles injected at rate of 100 gms. in 18-20 minutes.)

*The Australian Tractor Testing Committee is a joint body established by agreement between the Commonwealth, the States, and the University of Melbourne; under this agreement the tests are carried out by the University of Melbourne. The address of the Tractor Testing Committee is: C/o Department of Primary Industry, 301 Flinders Lane, Melbourne.
### 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>NA</td>
<td>Two tests</td>
</tr>
<tr>
<td>Large</td>
<td>Low</td>
<td>NA</td>
<td>Two tests</td>
</tr>
<tr>
<td>Small</td>
<td>High</td>
<td>10</td>
<td>Average of two tests</td>
</tr>
<tr>
<td>Small</td>
<td>Low</td>
<td>0.5</td>
<td>Average of two tests</td>
</tr>
</tbody>
</table>

(b) **Back Pressure:** At High Load, 4½ inches water.
(c) **Temperatures:** Not taken.
(d) **Noise Levels:** Not taken.

5. Comment.

(a) **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 unscreened carbon particles could escape.

(b) **Screen Openings and Material:** The screen consists of perforated 26-gauge stainless-steel sheet. Overseas tests suggest that burning of carbon particles which may become caught in the screen leads to rapid failure unless the screen is 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.

(c) **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 to be renewed as required.

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.

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**International AW-7 Spark Arrester.**

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, 1st August, 1958.
W. F. Baillle, G. H. Vasey,
Testing Officer, Officer-in-Charge,
Tractor Testing.

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