

AEROSPACE RECOMMENDED PRACTICE

Submitted for recognition as an American National Standard

SAE ARP890

REV.
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Spark Plug Rating Calibration

FOREWORD

This revision contains editorial/format changes only.

INTRODUCTION

It has been found that the cooling rate of spark plugs in comparison with the indicated mean effective pressure on the piston can vary greatly between one cylinder head and another. Also, on occasions, a wide variation in ratings was found between those taken at one time in comparison with those taken at another time on the same cylinder head. These differences were due to many conditions, some of them controllable and some uncontrollable. Accordingly, it is necessary to arrive at a means of correction for these variables so that comparable results can be obtained at all times. This is necessary in order to establish acceptable standards for use in development work and in the application of production quality control.

After considerable work on the investigation of rating correction means, it has been decided that carefully made spark plugs offer the best method of detecting and compensating for engine and operating variables. The spark plug models which have been determined as satisfactory for this purpose are listed in AS889.

As a result of the research program, the following procedure is recommended for the use of calibration spark plugs.

1. SCOPE:

Procedure for obtaining the corrected heat-rating values (indicated mean effective pressure, IMEP) of spark plugs rated in the SAE 17.6 cubic inch rating engine (SAE AS840).

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2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. In the event of conflict between the text of this specification and references cited herein, the text of this specification takes precedence. Nothing in this specification, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AS840 Manual for the SAE 176..6 Cubic Inch Spark Plug Rating Engine, Including Maintenance and Overhaul

AS889 Calibration Spark Plugs

3. RECOMMENDED PROCEDURE FOR USE OF CALIBRATION SPARK PLUGS:

3.1 Master Calibration Spark Plugs:

Obtain three specially selected uniform, prerated spark plugs of the model required for calibration purposes (see AS889). These shall be considered as master calibration spark plugs.

3.2 Working Calibration Spark Plugs:

Obtain an appropriate number of the same model spark plugs as in paragraph 3.1. These will be known as working calibration spark plugs.

3.3 Determination of Standard Rating of Working Calibration Spark Plugs:

3.3.1 Rate the three master calibration spark plugs (M_1 , M_2 , M_3) three times, alternating these ratings, in the same rating engine with those in paragraph 3.3.2.

3.3.2 Rate as many working calibration spark plugs (W_1 ---- W_n) as are desired. It is recommended that at least ten working calibration spark plugs be available for use at all times.

3.3.3 Calculate the standard rating of each of the working calibration spark plugs as follows in Equation 1:

$$\text{Rating of } W_1 = \frac{\left(\text{Avg. of the 3 ratings obtained for } W_1 \right) \times \left(\text{Avg. of the assigned ratings}^1 \text{ of } M_1, M_2, M_3 \right)}{\text{Avg. of the 9 ratings obtained for } M_1, M_2, M_3} \quad (\text{Eq. 1})$$

¹ As assigned by the supplier through prerating or as previously determined by the recommended procedure (paragraph 3.3.5).