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Calibration Nozzle and Holder Assembly for Diesel Fuel Injection Systems – SAE J968c

SAE Recommended Practice
Last Revised November 1975

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PREPRINT

CALIBRATION NOZZLE AND HOLDER ASSEMBLY FOR DIESEL FUEL INJECTION SYSTEMS—SAE J968c

SAE Recommended Practice

Report of Engine Committee approved August 1966 and last revised November 1975.

PURPOSE—Calibrating nozzle and holder assemblies are used either singly or in combination for the calibration of diesel fuel injection pumps of the unit, or camshaft type. The design of the calibrating nozzle and holder assembly shown is intended for use with fuel injection system configurations, the fuel delivery of which does not exceed 400 mm³ per injection.

This calibrating nozzle and holder assembly is intended to simulate the function of the nozzle and holder assembly in the fuel injection system of the engine. For simplification purposes, one calibrating nozzle and holder assembly is to be used to simulate many different actual engine nozzle and holder assemblies and, as such, represents a compromise of their collective characteristics.

Historically, two different nozzles have been used for the calibration of diesel fuel injection pumps. Because of inherent design features, these nozzles tend to be difficult to maintain for calibration purposes. This SAE Recommended Practice describes a single, easily maintained nozzle used with replaceable orifice plates to provide the flow characteristics required over the recommended flow range.

PRACTICE—The SAE Recommended Practice is to use the calibrating nozzle and holder assembly, shown in Fig. 1, with a spray orifice selected from Table 1, for the fuel flow range required, and to maintain the assembly as described below.

The calibrating nozzle and holder assembly, shown in Fig. 1, consists of the same type holder body (Fig. 1a) as formerly used, an orifice plate (Fig. 1b), a differential type nozzle (Fig. 1c), a 4 mm (0.157 in) wire diameter spring (Fig. 1d), an adapter and a special retaining nut. Should the former holder assembly be used as a sub-assembly replacement in this

SAE calibrating unit, it is recommended that a 3.9-4.1 mm diameter X 90 deg countersink be added to the centerhole at the holder body pressure face to assure adequate clearance with the valve stem fillet radius. Use of the provided spray damper and retaining ring are optional.

Calibrating nozzle and holder assemblies are, in effect, gages and should be carefully maintained. *It is recommended that components including orifice plates should not be interchanged between nozzle and holder assemblies. In any case requiring the disassembly and reassembly of a calibrating nozzle and holder assembly, as in the case of replacement of components including orifice plates, the assembly must be flow checked using SAE Master Pump J981 and must meet the flow limits established in Table 1.* It is recommended that the flow and nozzle opening pressure of the units be inspected after every 100 pumps have been calibrated using the calibrating nozzle and holder assemblies, or if 30 days have elapsed since last use of the nozzle and holder assemblies.

INSPECTION OF CALIBRATING NOZZLE AND HOLDER ASSEMBLY—

1. **Nozzle Opening Pressure**—Check and reset if necessary to 3000 ± 25 psi (20.7 ± 0.17 MPa).

2. **Seat Leakage**—Maintaining pressure at 2800 ± 50 psi (19.3 ± 0.34 MPa) there must be no visible wetting of the adapter face in 15 s.

NOTE: Spray damper must be removed for this test.

3. **Delivery**—Must be within the range shown in Table 1 for the orifice size being tested using a Master Pump (SAE J981). Calibrating oil is to conform to SAE J967 at 110-115°F (43-46°C) and Test Stand is to conform to SAE J970.

TABLE 1—ORIFICE SIZE RANGES

SAE Orifice Size, mm	Flow Limits 1000 Strokes,		Pump Speed, Rpm	High Pressure Line					
	Max	Min		Inch-Pound Units			SI (Metric) Units		
				OD	ID	Length	OD	ID	Length
0.4	55.0	54.5	1400 ± 5	0.250 × 0.084 × 25 in	6.35 × 2.1 × 635 mm				
0.5	76.5	75.5	1300 ± 5	0.250 × 0.084 × 25 in	6.35 × 2.1 × 635 mm				
0.6	105	104	1200 ± 5	0.250 × 0.084 × 25 in	6.35 × 2.1 × 635 mm				
0.7	146.5	145	1100 ± 5	0.250 × 0.084 × 25 in	6.35 × 2.1 × 635 mm				
0.8	210	208	1000 ± 5	0.250 × 0.084 × 25 in	6.35 × 2.1 × 635 mm				