The Engineering Society
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Land Sea Air and Space

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Method for Evaluating Material Separation in Automotive Sealers Under Pressure in Static Conditions

SAE Recommended Practice
Issued April 1987

Submitted for Recognition as
an American National Standard

The Engineering Society For Advancing Mobility Land Sea Air and Space

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MATERIALS PRACTICE

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METHOD FOR EVALUATING MATERIAL SEPARATION IN AUTOMOTIVE SEALERS UNDER PRESSURE IN STATIC CONDITIONS

1. SCOPE: This SAE Recommended Practice sets forth a method for measuring pressure induced separation in automotive sealers and determining the likelihood of equipment failure due to this separation, also known as "caking".

2. BACKGROUND: Sealers in automotive plants are generally transported and applied via airless pumping equipment whose internal pressures may exceed 20.7 MPa (3000 psi). Some sealers have a tendency to separate when exposed to pressures of this magnitude which results in varying degrees of system blockage.

   This pressure induced "caking", or blockage of the pump and transport lines, reduces sealer delivery rates and can completely shut down the system.

   Separation tests run on sealers at 20.7 MPa (3000 psi), 25°C (77°F) for 72 h with measured separation volumes of over 6 ml have been known to cause "caking" problems in production pumping equipment whereas sealers with measured separation volumes of 3 ml or less have not caused this type of problem.

3. PRINCIPAL OF METHODS: This recommended practice involves injecting an automotive sealant into a pressure cup assembly equipped with a moveable piston cap. The sealant is then subjected to a static pressure by applying a force to the pressure cup assembly via the piston cap. This force is supplied by means of a multi-power air cylinder for a specified time, after which the pressure is removed, the cylinder is disassembled and any separated material present is then measured.

4. EQUIPMENT:

Johnstone Sep-Check part no. 110-085-1 or equivalent (See Fig. 6)
Sealer to be tested 2 - 350 ml (12 oz) tubes, air free
50 ml graduated cylinder
25 ml graduated cylinder
Spatula
Cleaner (recommended by sealant manufacturer)
Air compressor

5. PRESSURE CUP ASSEMBLY[1]: See Fig. 5:

5.1 To assemble pressure cup, attach (3) socket screws to piston retain cap, and tighten.

5.2 Carefully insert piston through bottom of pressure cup so no damage is done to "O" ring.

5.3 Attach (3) socket screws to pressure cup bottom cap and tighten carefully so no damage is done to "O" ring; make sure bottom cap is flush with bottom of pressure cup.

5.4 Attach gauge and bleeder valve to pressure cup.

5.5 Ready to load with material.

6. PRESSURE CUP MATERIAL LOADING:

6.1 Acquire two 350 ml (12 oz) tubes of air free sealant.

6.2 Open bleeder valve on pressure cup container.

6.3 Push the piston cap to the bottom of the pressure cup.

6.4 Remove 6.35 mm (1/4 in) pipe plug. Insert sample tube to the inlet at the bottom cap of the pressure cup.

6.5 Fill the pressure chamber till the material bleeds out of the bleeder valve, then close.

6.6 Continue to fill until the piston cap reaches the top of the pressure cup.

6.7 Remove the sample tube and plug the 6.35 mm (1/4 in) inlet.

6.8 Reopen the bleeder valve to allow the excess pressure to escape; then close.

[1]Test cylinder shall be 44.45 mm (1.75 in) ID x 76.2 mm (3.0 in) in length with equidistant 0.0254 mm (0.001 in) gap between the cylinder wall and piston edge.

7. TESTING PARAMETERS[2]: See Fig. 6:

7.1 Set the multi power cylinder to predetermined air pressure to equal a 20.7 MPa (3000 psi) load to the pressure cup, or as specified.

7.2 Insert the pressure cup into the slot of the base stand.

7.3 Position the four-way hand valve in down mode. (At this point, air cylinder must remain on.)

7.4 72 h under these conditions are required, or as specified.

7.5 After 72 h period, position four-way hand valve to up, and remove pressure cap.

7.6 Remove bottom cap and push piston cap out until separated material is showing, if any exists. The separated material is the heavier deposit near the piston cap.

7.7 Carefully remove the heavier material from the piston. (Use a spatula.)

7.8 Determine in mL the volume of separated material using a graduated flask partially filled with water. Input the sectioned separated material and note the volume of displaced water.

8. PRESSURE CUP DISASSEMBLY AND CLEANING:

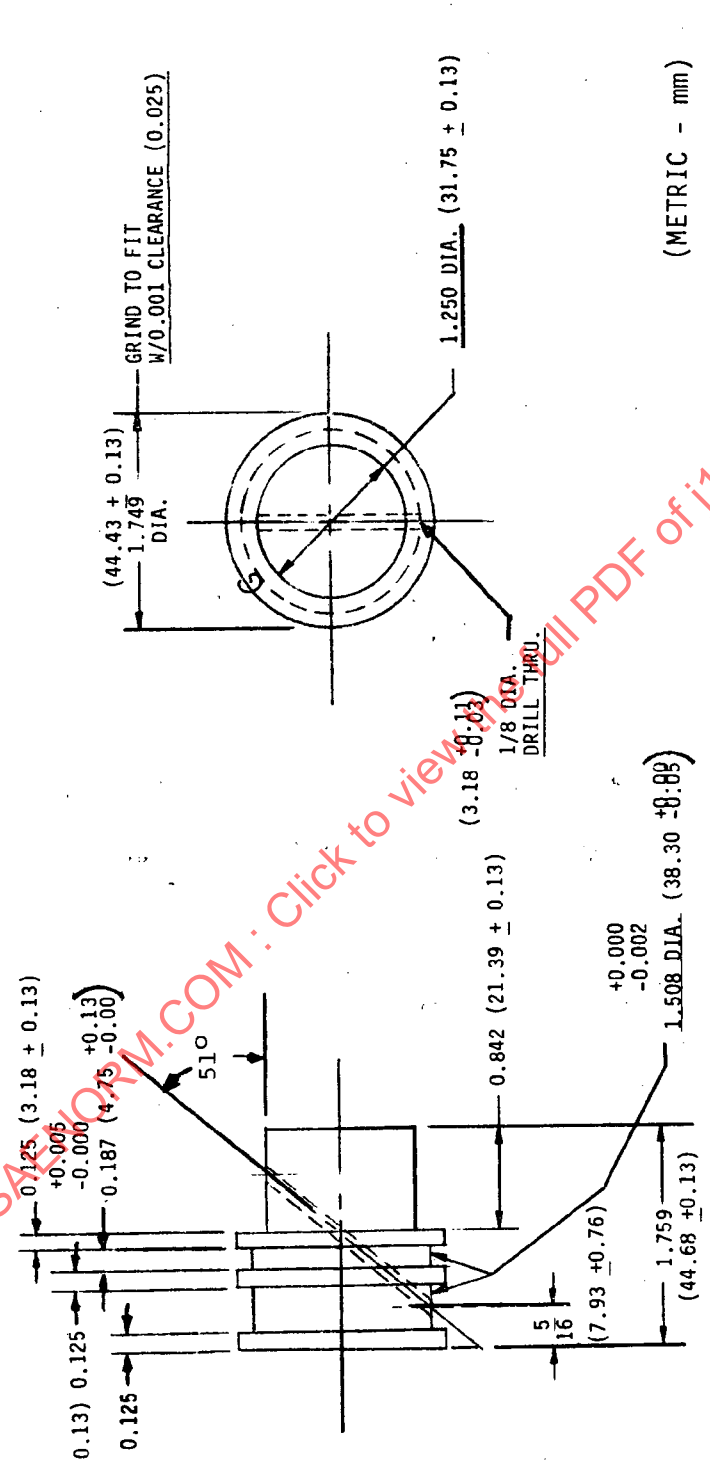
8.1 After a test is completed, clean all parts with recommended cleaner.

8.2 Inspect all "O" rings for wear and cuts. Replace all damaged "O" rings.

8.3 Reassemble pressure cup for next test.

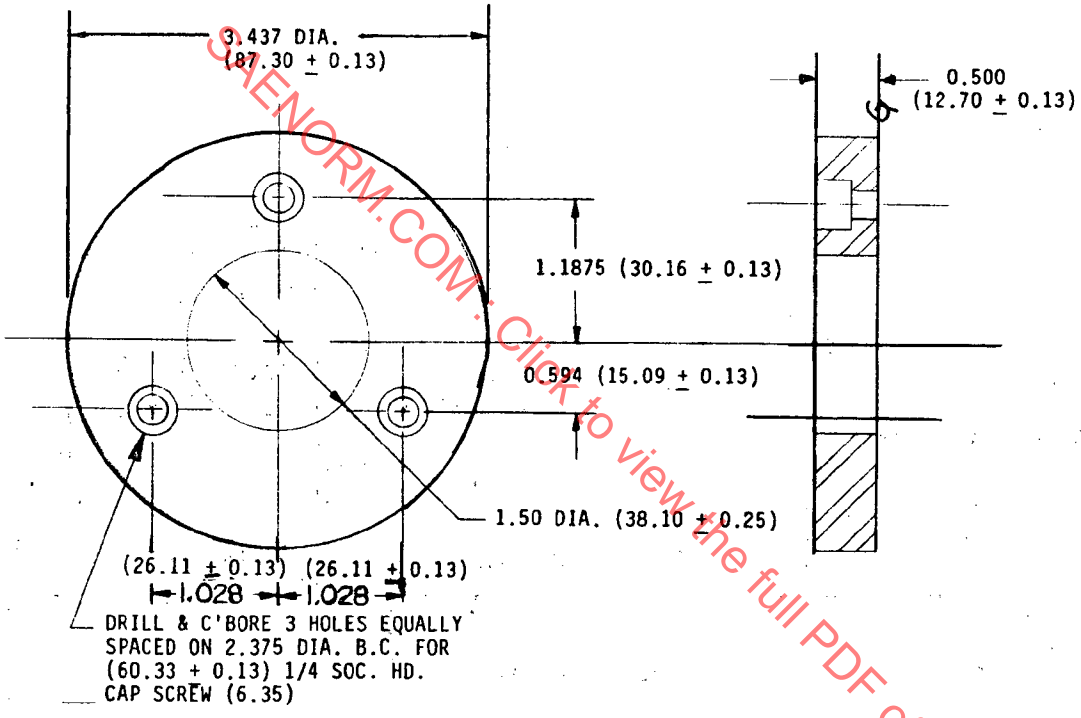
9. REPORT: Record the total volume of separated material, operating load, length of time load was applied and ambient temperature during the test.

[2]Any equipment capable of maintaining a constant load of at least 20.7 MPa (3000 psi) on the pressure cup may be used.



MATERIAL: 1117 C.R.S.

FIG. 1 - PISTON CAP



(METRIC-mm)

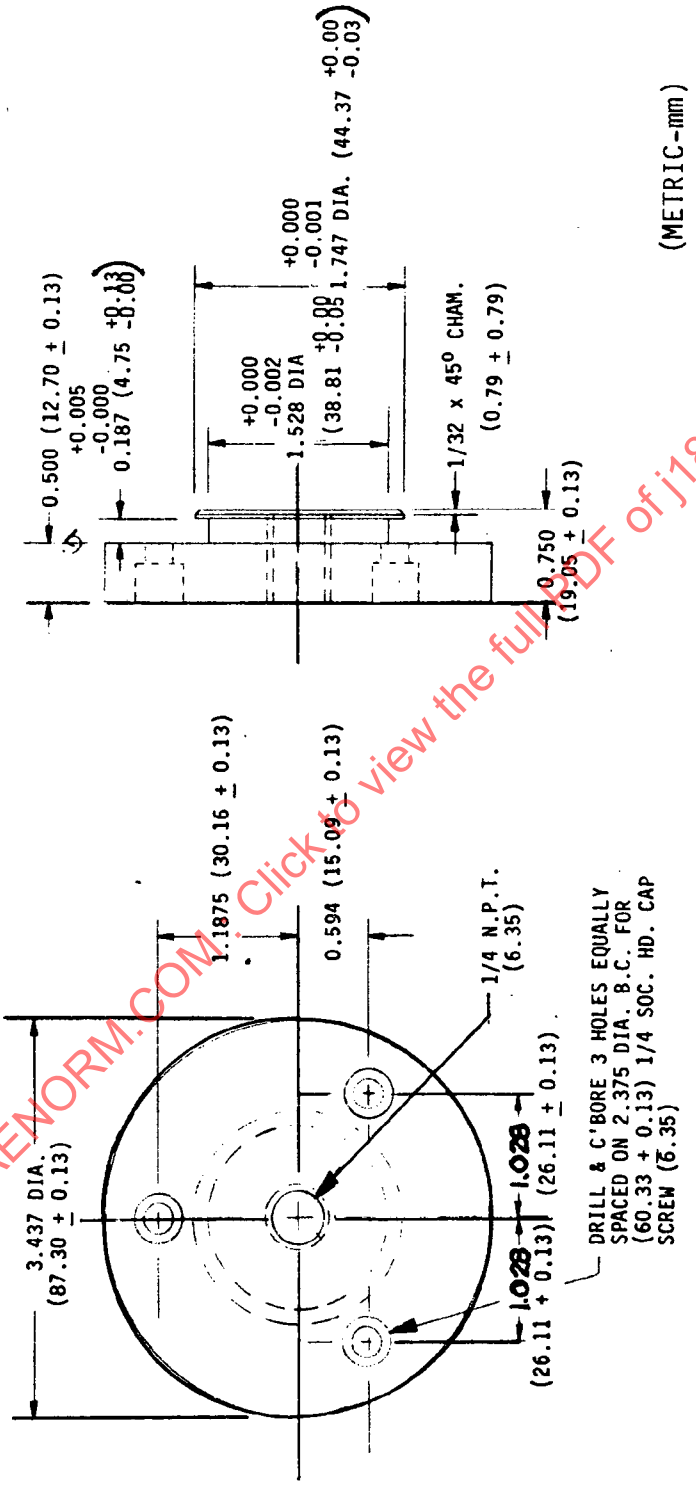
UNLESS OTHERWISE SPECIFIED
TOLERANCES

FRACTIONAL	±1/32
.0X	±.010
.00X	±.005
.000X	±.0005

BREAK ALL UNNECESSARY, SHARP CORNERS.

MATERIAL: 1117 CRS

FIG. 2 - PISTON RETAINER CAP .



(METRIC-mm)

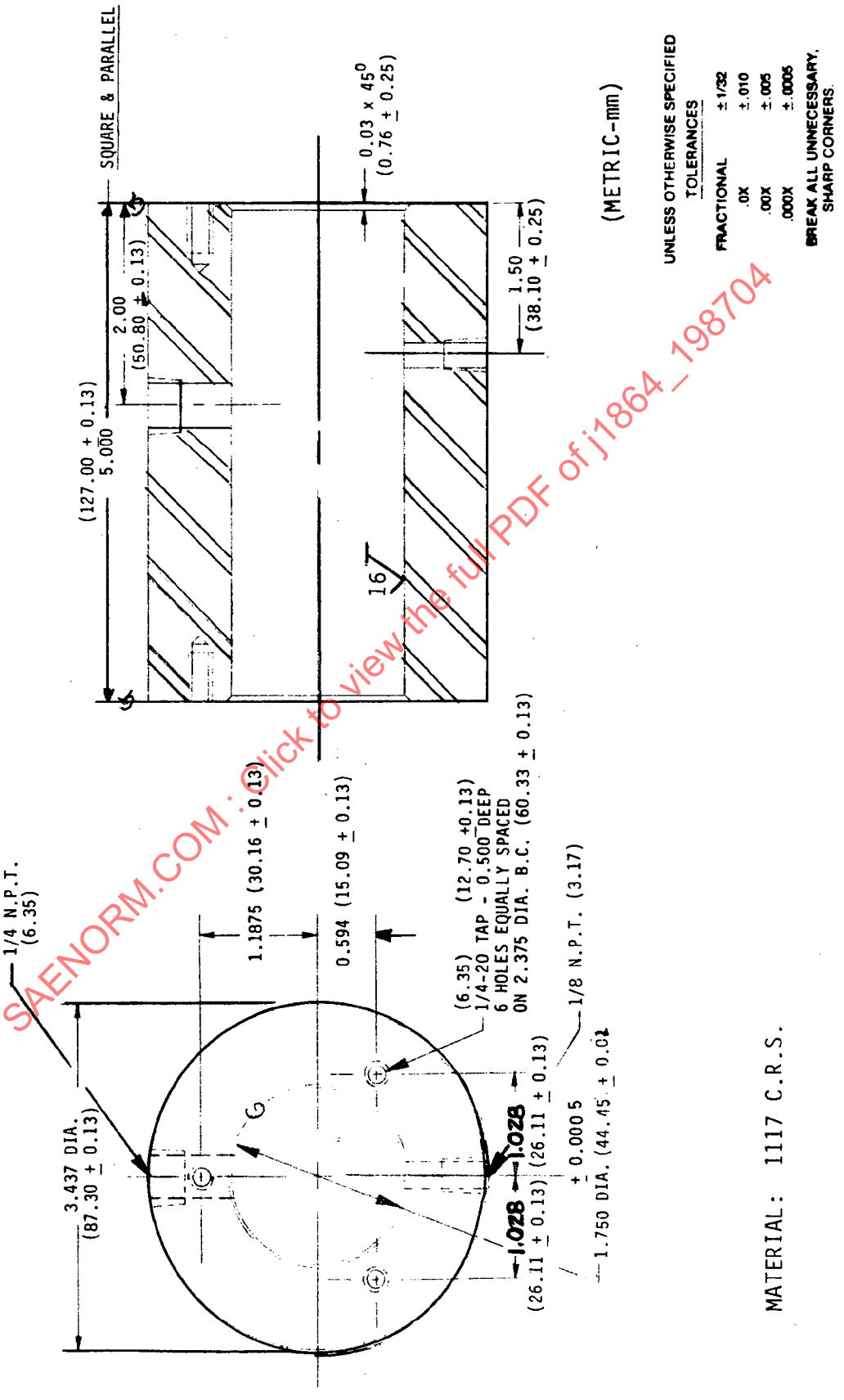
UNLESS OTHERWISE SPECIFIED
TOLERANCES

FRACTIONAL	±1/32
.0X	±.010
.00X	±.005
.000X	±.0005

BREAK ALL UNNECESSARY, SHARP CORNERS.

MATERIAL: 1117 CRS

FIG. 3 - PRESSURE CUP BOTTOM CAP



MATERIAL: 1117 C.R.S.

FIG. 4 - PRESSURE CUP

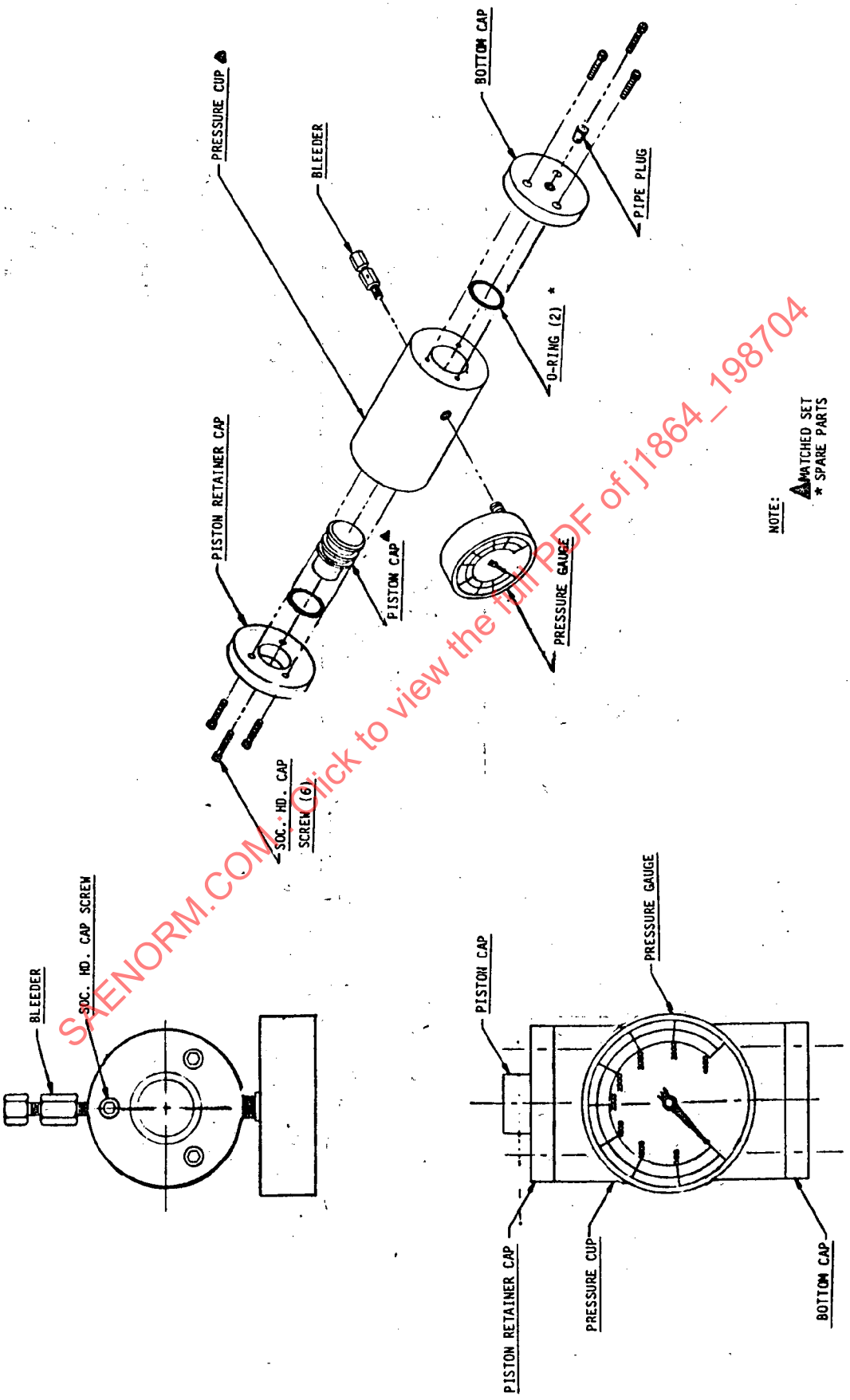


FIG. 5 - PRESSURE CUP ASSEMBLY