Fermilab

Particle Physics Division
Mechanical Department Calibration
Standards/Procedures

Number: MD-CALPROC-015 **Date:** 6/26/2009

Manufacturer: Dwyer

Model: Series 1425 Hook Gage

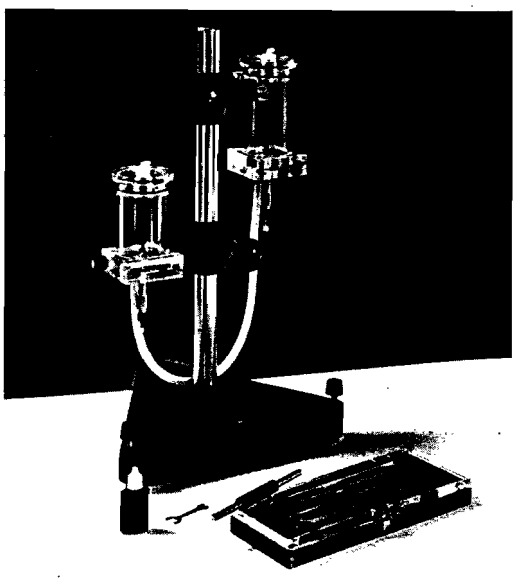
Reviewer(s): James E Tweed

This Procedure is used for:

Procedure for using a Dwyer Hook Gauge.

Series 1425 Hook Gage

Operating Instructions



The Dwyer 1425 series Hook Gage provides a reliable and extremely accurate standard against which other air pressure measuring instruments can be checked or calibrated. It is particularly useful when checking very low air pressures often encountered in HVAC balancing and for fan or blower testing. Its range and accuracy make it a valuable laboratory instrument for many types of industrial test work where maximum precision is required.

The 1425 is available in four models with ranges of 0-12 or 0-24 inches of water and 0-300 or 0-600 millimeters of water. There are no hidden tubes which could trap air bubbles, no long lead screws with the possibility of cumulative errors. An integral thermometer supplies data for temperature corrections.

Two level vials with a sensitivity of 115-125 seconds per 2 MM of bubble movement are integral with the base and assure that the column is perfectly plumb. Two depth micrometers and a set of end measuring rods comply with Federal specification GGG-C-105A and are traceable to masters at the National Bureau of Standards. These top quality features combined with a careful operator can easily result in readings consistently accurate to ± .001 inches.

OPERATING INSTRUCTIONS

1. Install column in base and secure with set screws. Position pressure well assembly on column allowing approximately 4 inches between bottom of bracket and top of column socket.
2. Position vacuum well assembly directly above the pressure well making certain height gaging anvils are in true vertical alignment in relation to each other and exactly 1 inch or 25 millimeters apart. This is established by inserting the appropriate gage rod between the anvils and adjusting the spacing until it fits snugly without binding. Tighten clamping knob firmly.
3. Select a stable surface free from vibration and level instrument with adjusting screws, centering both bubbles within lines on spirit levels.
4. Add the fluorescein green color concentrate to distilled water in the ratio of ¾ oz. to 1 quart. Remove either pressure connection and add mixture until it reaches the leveling line marked on vacuum well. Final adjustment can be made with the level adjustment knob on pressure well. Check to make sure no air is trapped in tubing. Replace fitting.
5. With pressure connections open and vented to atmosphere, set both micrometers to read zero.
6. Loosen zero adjustment locking rings, (1425-28) on both micrometers. Rotate hooks until points just begin to dimple surface of water. Tighten locking rings. Recheck settings to make sure both micrometers read exactly zero when hook points contact surface of water.

   NOTE: For greatest accuracy it is critical that the operator be able to consistently determine the precise point at which the hook contacts the waters' surface. This can be made easier by positioning a light source overhead and a mirror behind each well. When observed from below, the surface has a bright mirror-like appearance which greatly enhances visibility. Experiment to find best arrangement. With care, repetitive accuracy of .001" is possible.
7. The Hook gage is now properly set-up for readings from 0-1 inch or 0-25 millimeters.
8. Make sure both connections remain open and attach tubing. For positive (above atmospheric) pressure connect to left or pressure side. For negative (below atmospheric) pressure connect to right or vacuum side. For differential pressure, connect to both sides.
9. Apply pressure (positive, negative, or differential) and allow a few seconds for fluid levels to stabilize. Adjust both micrometers until each hook again just contacts surface of water as described in paragraph 6. The sum of the two readings is the pressure.
10. For higher pressures, refer to range chart below and select rod of appropriate length. Adjust vacuum well height as described in paragraph 2.
11. When finished, check spirit levels in base to assure no movement has occurred while taking readings.

CLEANING

Clean only with soap and water. Other fluids or solvents may attack and damage the acrylic components. To clean, remove well cap fasteners and lift off well cap. When reassembling apply small amount of silicone stop cock grease or petroleum jelly to o-rings.

GAGE ROD LENGTH VERSUS RANGE

INCHES					
ROD	RANGE	ROD	RANGE	ROD	RANGE
1	0-2	9	8-10	17	16-18
3	2-4	11	10-12	19	18-20
5	4-6	13	12-14	21	20-22
7	6-8	15	14-16	23	22-24
MILLIMETERS					
25	0-50	225	200-250	425	400-450
75	50-100	275	250-300	475	450-500
125	100-150	325	300-350	525	500-550
175	150-200	375	350-400	575	550-600

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TEMPERATURE CORRECTIONS

Minor corrections are necessary due to the change in density of water as the temperature varies. Each Dwyer 1425 series Hook Gage includes a thermometer located at the base of the high pressure well assembly. Take a reading and refer to the appropriate correction curve to establish density at that temperature. To correct observed pressure reading use one of the following formulas.

Models 1425-12, 24 – Inches of water readings

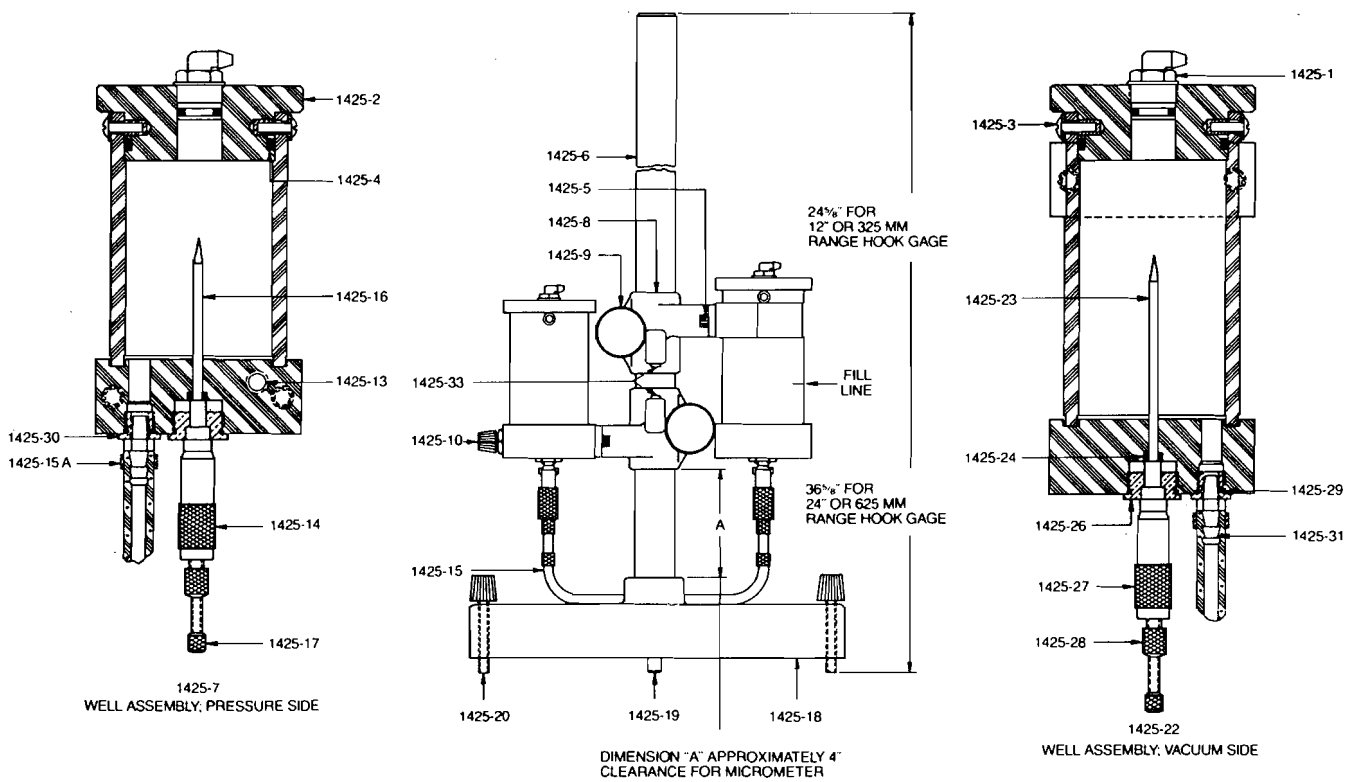
$P(c) = P(o) \times .01602 \times D$ where:

- P(c) = Pressure corrected for temperature/density
- P(o) = Observed pressure in inches water column
- D = Density of water in pounds/cubic foot at operating temperature

Models M1425-300, 600 – Millimeters of water readings

$P(c) = P(o) \times .99993 \times D$ where:

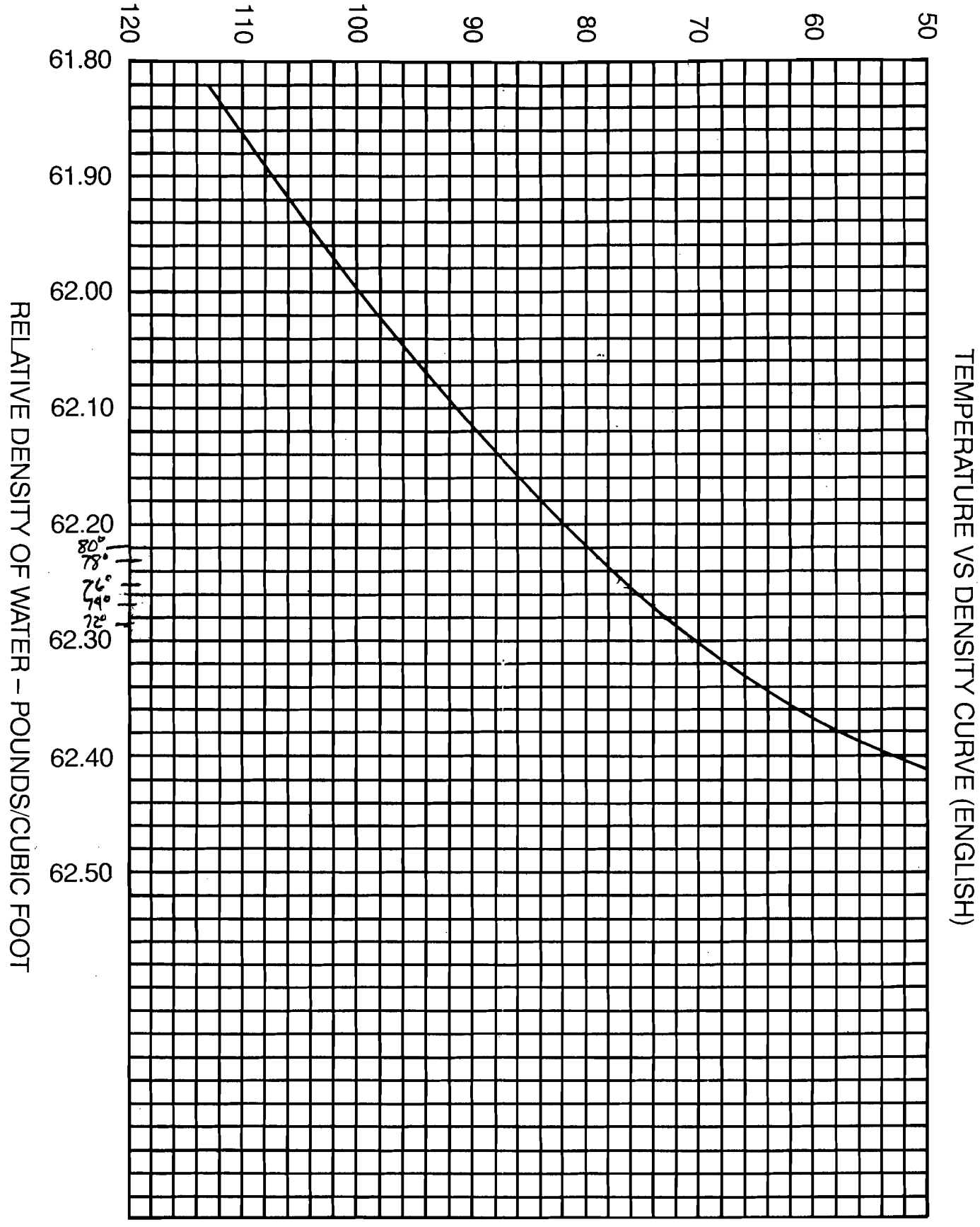
- P(c) = Pressure corrected for temperature/density
- P(o) = Observed pressure in millimeters water column
- D = Density of water in grams/cubic centimeter at operating temperature



PARTS LIST

1425-1	Pressure connection. Type "A" furnished unless other specified.
	A. Two molded nylon tubing connectors, rapid shut-off type. Also included are two 3 ft. lengths clear vinyl tubing and two ⅛" NPT tubing adapters.
	B. Two molded nylon tubing connectors, rapid shut-off type. Also included are one 9 ft. length rubber tubing and one 8" terminal tube.
	C. Two ⅛" NPT female connections.
	D. Two ⅛" NPT female connections with adapter for ¼" O.D. metal tubing.
	E. Two ⅛" NPT female connections with 3-way vent valve for ¼" O.D. metal tubing.
1425-2	Well cap. 2 required.
1425-3	Well cap screw, 10-32 × ⅜". 4 required.
1425-4	Well cap O-ring, 2¼" × 2½". 2 required.
1425-5	Socket head cap screw, 5/16-18 × ⅞". 4 required.
1425-6-12	Column for 12" or 325MM model.
1425-6-24	Column for 24" or 625MM model.
1425-7	Well assembly, pressure side.
1425-8	Adjustable well bracket. 2 required.
1425-9	Clamping knob for well bracket. 2 required.
1425-10	Zero level adjustment assembly. Formerly parts listed separately as -10, -11, & -12.
1425-13	Thermometer, 50-90°F or 5-35°C.
1425-14	Micrometer, pressure side, 0-1" or 0-25MM.
1425-15-12	Reinforced vinyl tubing ¼" × ½" × 1.8 ft for 12" or 325MM models.
1425-15-24	Reinforced vinyl tubing ¼" × ½" × 2.8 ft for 24" or 625MM models.
1425-15-A	Hose clamp. 2 required.
1425-16	Hook, pressure side.
1425-17	Knurled knob for hook. 2 required.
1425-18	Base, with built in level vials.
1425-19	Support button.
1425-20	Level adjusting screw. 2 required.
1425-22	Well assembly, vacuum side.
1425-23	Hook, vacuum side.
1425-24	O'ring, 5/32" × 9/32". 2 required.
1425-26	Insert plug. 2 required.
1425-27	Micrometer, vacuum side. 0-1" or 0-25MM.
1425-28	Knurled locknut. 2 required.
1425-29	O'ring, 7/16" × 9/16". 2 required.
1425-30	Insert, ⅛" NPT female. 2 required.
1425-31	Tubing adapter, ⅛" NPT male to tubing.
1425-32	Spirit levels for base. 2 required. Not shown.
1425-33	Height gaging anvil. 2 required.
1425-34-A	Gage rod set in case, 12" model.
1425-34-B	Gage rod set in case, 325MM model.
1425-34-C	Gage rod set in case, 24" model.
1425-34-D	Gage rod set in case, 625MM model.
1425-35	Thermometer plug. Not shown.
1425-36	Dust cover. One size for all models. Not shown.
1425-37	Fluorescein green color concentrate, ¾ ounce bottle. Add to 1 quart distilled water. Not shown.
1425-38	Socket head cap screw, ⅜-24 × ⅜". 4 required. Locks column in base. Not shown.

TEMPERATURE VS DENSITY CURVE (ENGLISH)



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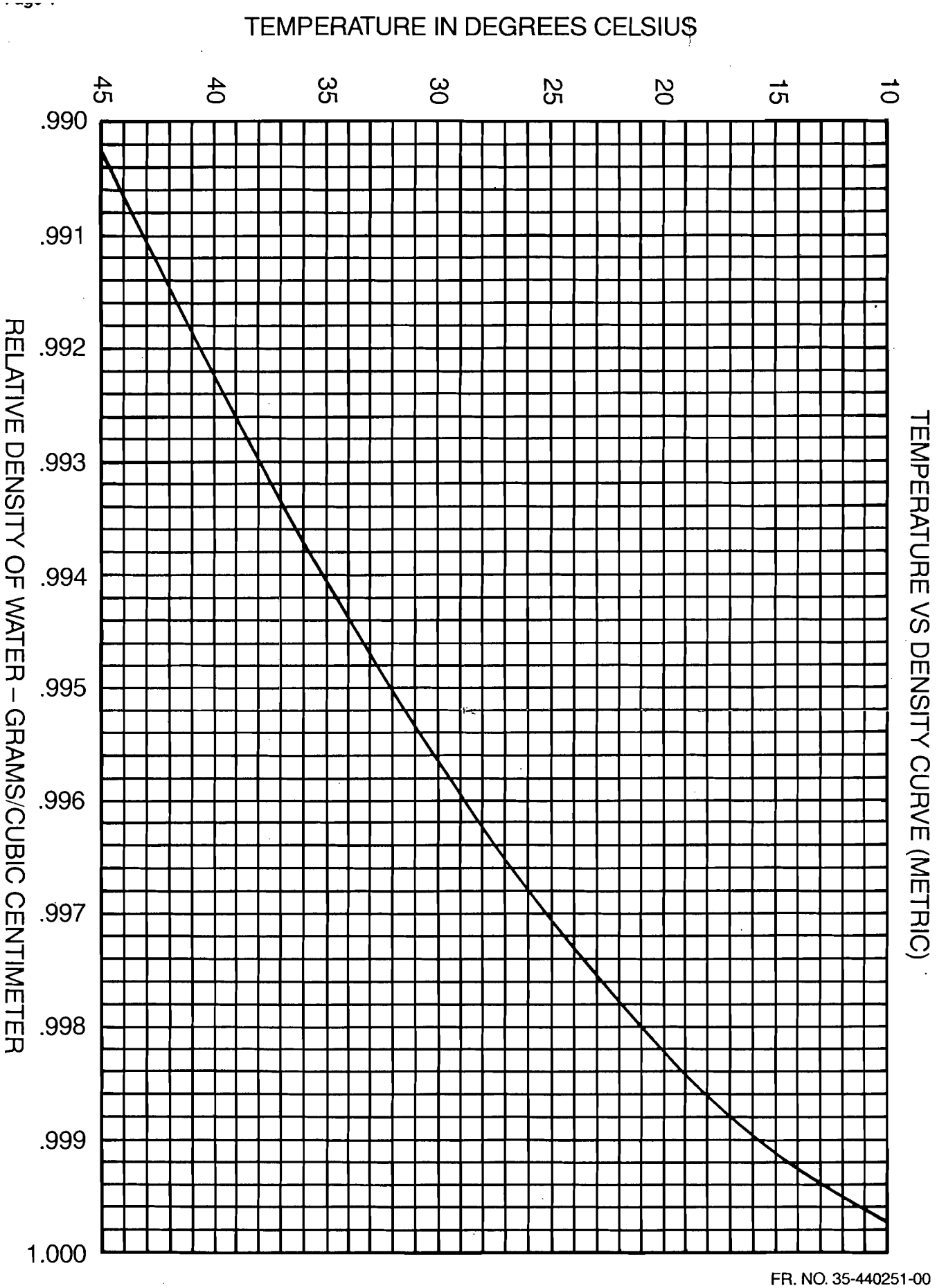

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