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# A STRETCHED FOIL SAMPLE HOLDER FOR LIQUIDS

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A very thin walled liquid sample holder using 0.002″ stretched aluminum foil windows has been described by Striffler and Carpenter[1]). This target has been acknowledged to have the thinnest windows so far reported for targets of this type[2]).

A modified version of this sample holder (figs. 1 and 2) has been developed which uses the stretched foil principle and is similarly intended for use under atmospheric conditions. It has several advantages over the target of Striffler and Carpenter. It is easier to fabricate since it has no critical dimensions. Assembly and filling are rapid since the windows stretch taut quickly and easily. Greater freedom of choice of materials which contact the enclosed sample is permitted by the new stretching method. Thin halocarbon films such as Teflon FEP, Aclar, and possibly others, as well as aluminum, can be used because of the increased stretching ability of this design. Halocarbon films are nearly impervious to accidental damage and can be used to contain corrosive liquids that are incompatible with aluminum.

The foils are clamped between the upper and lower body pieces and a Teflon O-ring making a liquid tight seal. Other rigid seal ring materials might be used. The O-ring thickness determines the amount of stretching of the foils and in turn is determined by the

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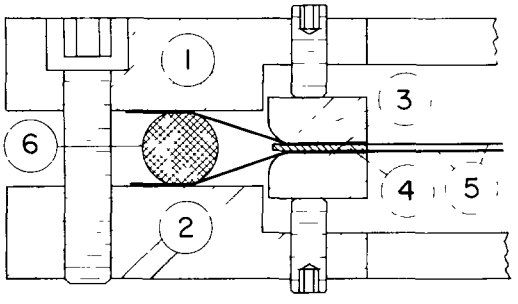


Fig. 1. Cross section of assembled sample holder. 1. upper body; 2. lower body, 3. clamp rings, 4. spacer ring; 5 foil windows, 6. Teflon O-ring.


Fig. 2 The assembled sample holder a. with 0.005″ Aclar windows, partially filled with colored water. The scale is graduated in inch (upper) and cm (lower); b with 0.0015″ aluminum windows.

target diameter and the type and thickness of windows used.

Tests were made with a Teflon O-ring of 4.00″ i.d. and 0.200″ dia. cross section, a 3.19″ dia. target (5.125″ overall dia.) and a 0.015″ spacer, using 0.002″ aluminum and 0.005″ Aclar 33C foils. The bulging of the aluminum foils was 0.002″–0 005″ while the Aclar bulged 0.007″. Bulging, defined as the difference in thickness between the filled and empty targets at the target center, is easily measured with a depth micrometer. With the same target it was necessary to use a 0.375″ cross sectional dia. O-ring to stretch 0.002″ Aclar with a bulging of 0.007″.

The empty target is assembled while lying flat by tightening the upper and lower target body pieces against the foils and the O-ring while the clamp ring screws are retracted. The foils are then stretched taut by the clamp rings when the eight equally spaced screws are gradually tightened top and bottom alternately around the periphery. Too much tightening of the clamp rings will wrinkle an aluminum foil window. The target is filled with a hypodermic syringe through fill and vent holes drilled in the O-ring opposite a gap in the spacer. The target is filled until it overflows from the fill and vent holes. This ensures that the region between the spacer and O-ring is filled since the clamp ring-foil-spacer is not liquid tight.

It has been found helpful with certain types of aluminum foil windows to place a thin ring of Teflon between the clamp rings and the foils to reduce the possibility of the foils tearing during the stretching process.

Aluminum foil targets can be X-rayed for voids as outlined in[1]). The nearly transparent halocarbon film targets can be examined visually both during filling and in use, a highly desirable feature

Halocarbon film targets produce a somewhat higher background than aluminum in neutron scattering experiments. In all cases the halocarbon films bulged significantly more than aluminum foils and among the halocarbons tested, the bulging was greater for Teflon FEP than for Aclar. Aluminum foil targets have the advantage of reduced target bulk since the thinnest foils can be stretched taut with thinner O-rings.

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## References

[1]) C D. Striffler and J M. Carpenter, Nucl Instr. and Meth **24** (1963) 395.

[2]) J A R. Griffith and E J Burge, Rev Sci Instr **37** (1966) 147.