

LETTER TO THE EDITORS

TETRAFLUOROETHYLENE COATINGS ON CONDENSER TUBES

(Received 7 March 1966)

REGARDING the comments [1] by Le Fevre and Rose on the paper "Tetrafluoroethylene Promoted Dropwise Condensation" by Edwards and Doolittle [2], recent work at the Admiralty Materials Laboratory has shown that a Fluon film on an 18 swg $\frac{3}{8}$ in O.D. 70/30 copper-nickel condenser tube, operating at 26 inHg vacuum, gives the same quality of dropwise condensation and the same heat-transfer results as a tube promoted with a stearic acid-liquid paraffin mixture. Heat fluxes obtained ranged from 29000 to 90000 Btu/h ft² with average cooling water temperatures of 58-53°F and water velocities of 2.19-14.6 ft/s. The Fluon film thickness was therefore of the same total thermal resistance as the adsorbed acid. The Wilson method of determining resistances indicated a film thickness of 0.0001 in, which was confirmed by an eddy current dependent film thickness meter manufactured by Ultrasonoscope Ltd. Using a thermal conductivity value of 0.14 Btu/ft h degF the temperature drop across the film was thus 1.7-5.4 degF, and in the results of Edwards and Doolittle could be 2.1-4.2 degF and not 20-40 degF as suggested by Le Fevre and Rose. Tests over a period of 2500 h showed that there was no deterioration in the Fluon film or in the thermal performance of the tube during that period.

Following the work by Erb and Thelen [3] in the U.S.A., gold has also been evaluated for its water-repellent properties. In comparison with Fluon it is more difficult to obtain a highly water-repellent coating, and the treatment is expected to be more costly. Further work is therefore being undertaken at A.M.L. to determine ways of using Fluon coated tubes in turbine and distiller condensers.

REFERENCES

1. E. J. LE FEVRE and J. W. ROSE, *Int. J. Heat Mass Transfer* **8**, 1179 (1965).
2. J. A. EDWARDS and J. S. DOOLITTLE, *Int. J. Heat Mass Transfer* **8**, 663-666 (1965).
3. R. A. ERB and E. THELEN, *Ind. Engng Chem.* **10**, 49-52 (1965).

D. W. BUTCHER
C. W. HONOUR

*Admiralty Materials Laboratory,
Holton Heath, Poole, Dorset*

REJOINDER

With regard to the above letter by D. W. Butcher and C. W. Honour we would like to point out that the Teflon film used by Edwards and Doolittle was stated by these latter authors to have had a "nominal thickness of 0.001 in". Our estimate of the temperature drop was thus based on

this thickness. Obviously, if one considers a layer having one tenth of this thickness one obtains, for the same heat flux, one tenth of the temperature difference.

E. J. LE FEVRE
J. W. ROSE