of 150, with those of ORNL, obtained on material with a r.r. ratio of about thirty. They find a thermal conductivity which, at 50°C, is some 5 per cent larger than the ORNL value, and an electrical resistivity which agrees with the latter almost within the quoted precision. Powell and Tye then explain their larger value of λ by the higher purity of their specimen, and the agreement in ρ as due to a (presumed) larger porosity of their specimen. This is nonsense! Porosity, within the conventional definition of the word, acts as a geometrical factor and, the ratios of the respective conductivities of tungsten to those of the pores being what they are, should affect λ and ρ near room temperature by factors equal to about one part in 10^4. There are therefore two distinct discrepancies between the results of [1] and the results of ORNL: the discrepancy between the r.r. ratios and ice-point resistivities, and the one between the thermal conductivities and electrical resistivities. Powell and Tye can explain, at least to their own satisfaction, one or the other of these discrepancies by arbitrarily assuming a suitable porosity, or the lack thereof, but they cannot have it both ways. In this connection I should like to mention that there exists an independent check on at least one parameter reported by ORNL; at their request we have measured the electrical resistivity of a specimen of their tungsten using a high-current square-wave comparator. Our results differed from theirs by $+0{\cdot}1$ per cent at 300°K and $-0{\cdot}3$ per cent at 1500°K, with a maximum deviation of $-0{\cdot}38$ per cent at 900°K.

In conclusion I would like to point out that near room temperature the results of [1] frequently deviated in a characteristic way from the results obtained in other laboratories, in having a thermal conductivity larger by 5 per cent or so relative to the measured electrical resistivities. It occurs here in tungsten ($\Delta\lambda = +5$ per cent, $\Delta\rho \sim 0$), it occurs in copper relative to our work (Sp. 1: $\Delta\lambda \sim 0$, $\Delta\rho = -3$ per cent; Sp. 3: $\Delta\lambda = +2$ per cent, $\Delta\rho = +3$ per cent) and has previously occurred in the values they reported for platinum [6, 7]. In my opinion this characteristic deviation, combined with the lack of meaningful specimen characterization, the lack of any estimate of experimental accuracy, and the internal inconsistencies, renders their results contained in the two sections that I have discussed of little value as far as precise determinations of conductivities of solids are concerned.

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M. J. LAUBITZ

Division of Applied Physics
National Research Council
Ottawa 7
Canada

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REJOINDER

LAUBITZ is correct in that many of the results presented by us [1] do not conform to the idealized requirements of our introductory remarks. These remarks were directed towards the future and its needs. Our paper never pretended to match up to these requirements. It was, as Laubitz is well aware, an attempt to present results of past work on which no further measurements were possible, and which, if not then presented, would probably have been lost

forever. These included sundry test measurements, made at various times during the previous 30 years or so, often by different assistants and often, as for two of the copper samples, on unknown materials submitted by other organizations.

On the general question of accuracy, reference [2] of our paper, (reference [3] of Laubitz) does deal with the major source of inaccuracy, although Laubitz states that this paper does not contain any mention of accuracy. This paper describes how heat inflow is measured in terms of the temperature gradient in a rod of a similar diameter and of known thermal conductivity and the heat outflow is measured calorimetrically. After correction these two values should agree to within 2 per cent and an average value is used.

We have also to take exception to the final paragraph of Laubitz's section on copper:

The quotation "the values of L tend to increase with increase in thermal conductivity and purity", when taken from its context as in this section, seemed an odd statement for us to have made. Reference to the full text shows this statement to be a true statement of fact, since it merely describes the nature of the variation shown by the collected results of all workers as set out in Table 2.

The comment regarding tungsten seems trivial. It stems from a surmise made by ourselves involving another supposition about the density of our samples. We certainly would not attempt to stress such a surmise where, if considered sufficiently important, a density measurement and an independent resistivity determination would be so much more satisfactory. But, to name this surmise as "nonsense" overlooks the fact that the metal in question is one in which less than two thirds of the heat conduction occurs by the same mechanism as the electrical conduction. Our surmise would require the other component of heat conduction to be more dependent on impurity than on porosity.

The concluding paragraph is also likely to mislead. It is true as stated that there is a similarity in the differences between our results and those of other laboratories for tungsten, copper and platinum, but to stop here gives a biased impression, which is not supported by other results given by us in our present paper. These are the results of Table 5 for both pure iron and Armco iron and of Table 7 for Inconel 702, where closer agreement is apparent. It may be significant that these samples were of larger diameter.

To sum up, we consider that these comments of Laubitz have not all been made with the care that is expected from a fellow worker. In the case of copper, it would seem more appropriate for his comments to be incorporated in the discussion section of his reference [2], the forthcoming paper describing measurements on this metal.

In our paper, [1] p. 584, line 9, a correction is necessary, "± 3 per cent" for "13 per cent".

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R. W. POWELL*
R. P. TYE†

* *Purdue University*
Thermophysical Properties Research Center
West Lafayette, Indiana 47906
U.S.A.
† *Dynatech Corporation*
17 *Tudor Street*
Cambridge, Massachusetts 02139
U.S.A.