

on wind speed. For near-nude men exposed to air temperatures and pressure within the range in which they can live and work, the convective coefficient can be derived^{5, 12} from the equation.

$$h_c = c_2 (P_a/1013)^{0.6} V^{0.6} \dots \dots \dots (16)$$

where c_2 is approximately constant and is to be determined experimentally.

The value of the constant c_2 has been measured in the HSL wind tunnel. Mitchell *et al*⁵ reported measurements made on two nude Bantu male subjects resting in head-wind environments at temperatures between 10°C and 50°C and wind speeds between 0.5 and 5 m/s. The measurements have now been extended to two more subjects. The best available value is

$$c_2 = 8.32 \pm 0.39 \quad W s^{0.6} / m^{1.4} C$$

The equation for convective heat transfer applies only to forced convection. Vermeulen¹⁰ has demonstrated that in the relevant range of Reynolds number the effects of natural convection (buoyancy) are not apparent experimentally at wind speeds as low as 0.5 m/s. In underground conditions the difference between skin temperature and air temperature is generally small, and it is probably safe¹² to use the equation of forced convective heat transfer for values of air speed down to 0.1 or 0.2 m/s.

The value of the constant $c_1 = P_a \lambda h_m / h_c$ connecting convective and evaporative heat transfer can be calculated theoretically. For underground conditions Whillier¹¹ has calculated c_1 to be 1780°C. Subsequent calculations have indicated 1700°C to be a better value (A. Whillier, personal communication). Whillier's λ was the latent heat of evaporation of water. Experiments have shown sweat to have a heat of evaporation 7 per cent higher than that of water⁸. Correcting for this difference gives

$$c_1 = 1820^\circ C$$

Finally, atmospheric humidity is generally expressed in the mining industry in terms of the wet-bulb depression and not the water vapour pressure. The vapour pressure difference $\Delta e = (e_s - e_a)$ can be expressed in terms of temperature using a standard expression for the wet-bulb depression² and the empirical formula for saturated water vapour pressure quoted in the British Standard Specification¹⁷ on the humidity of air. Accordingly:

$$\begin{aligned} \Delta e &= e_s - e_a \\ &= e_s - e_w + 6.6 \times 10^{-4} P_a (T_a - T_w) \\ &\quad [1 + 1.15 \times 10^{-3} (T_a - T_w)] \end{aligned}$$

NOTICES

FOURTH INTERNATIONAL CONFERENCE ON VACUUM METALLURGY

This Conference will take place in Tokyo from June 4th-8th 1973. The language used will be English.

Inquiries should be addressed to:

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$$\text{and } e_s = 6.105 \exp [17.27 \bar{T}_s / (\bar{T}_s + 237.3)]$$

$$e_w = 6.105 \exp [17.27 T_w / (T_w + 237.3)]$$

REFERENCES

1. BELDING, H. S., and HATCH, T. F. Index for evaluating heat stress in terms of resulting physiological strains. *Heating, Piping and Air Conditioning* 27: 129-136, 1955.
2. HODGMAN, C. D. (Editor-in-Chief). *Handbook of Chemistry and Physics*. Cleveland, Chemical Rubber Publishing Co, 39th Edition, 1957-1958, p 2316.
3. MITCHELL, D., and WYNDHAM, C. H. Comparison of weighting formulas for calculating mean skin temperature. *J. Appl. Physiol.* 26: 616-622, 1969.
4. MITCHELL, D., WYNDHAM, C. H., ATKINS, A. R., VERMEULEN, A. J., HOFMEYR, H. S., STRYDOM, N. B., and HODGSON, T. Direct measurement of the thermal response of nude resting men in dry environments. *Pflügers Archiv. ges. Physiol.* 303: 324-343, 1968.
5. MITCHELL, D., WYNDHAM, C. H., VERMEULEN, A. J., HODGSON, T., ATKINS, A. R., and HOFMEYR, H. S. Radiant and convective heat transfer of nude men in dry air. *J. Appl. Physiol.* 26: 111-118, 1969.
6. MITCHELL, D., WYNDHAM, C. H., and HODGSON, T. Emissivity and transmittance of excised human skin in its thermal emission wave band. *J. Appl. Physiol.* 23: 390-394, 1967.
7. MORRISON, J. F., WYNDHAM, C. H., MIENIE, B., and STRYDOM, N. B. Energy expenditure of mining tasks and the need for the selection of labourers. *J.S. Afr. Inst. Min. Metall.* 69: 185-191, 1968.
8. SNELLEN, J. W., MITCHELL, D., and WYNDHAM, C. H. Heat of evaporation of sweat. *J. Appl. Physiol.* 29: 40-44, 1970.
9. VAN GRAAN, C. H. The determination of body surface area. *S. Afr. Med. J.* 43: 952-959, 1969.
10. VERMEULEN, A. J. An investigation into the convection heat transmission between a circular cylinder with large diameter and air in transverse flow. *Report MEG 476*, Council for Scientific and Industrial Research, South Africa, 1966.
11. WHILLIER, A. The calculation of heat exchange between air and wet surfaces. *J.S. Afr. Inst. Min. Metall.* 67: 396-402, 1967.
12. WHILLIER, A., and MITCHELL, D. Prediction of the cooling rate of the human body. *J.S. Afr. Inst. Min. Metall.* 68: 103-114, 1968.
13. WYNDHAM, C. H., BOUWER, W. v.D. M., DEVINE, M. G., and PATERSON, H. E. Physiological responses of African labourers at various saturated air temperatures, wind velocities and rates of energy expenditure. *J. Appl. Physiol.* 5: 290-298, 1952.
14. WYNDHAM, C. H., BOUWER, W. v.D. M., DEVINE, M. G., PATERSON, H. E., and MACDONALD, D. K. C. Examination of use of heat exchange equations for determining changes in body temperature. *J. Appl. Physiol.* 5: 299-307, 1952.
15. WYNDHAM, C. H., BOUWER, W. v.D. M., PATERSON, H. E., and DEVINE, M. G. Practical aspects of recent physiological studies in Witwatersrand gold mines. *J. Chem. Metall. Min. Soc. S. Afr.* 53: 287-306, 1953.
16. WYNDHAM, C. H., STRYDOM, N. B., MORRISON, J. F., DU TOIT, F. D., and KRAAN, J. G. Responses of unacclimatized men under stress of heat and work. *J. Appl. Physiol.* 6: 681-686, 1954.
17. Humidity of the air. Definitions, formulae and constants. British Standard Specification BSS 1339, 1946.

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SYMPOSIUM ON BLAST FURNACE INJECTION (A.I.M.M.)

February 15-17, 1972

Circulars setting out the programme for the symposium, and registration forms, may be obtained from the Secretary of the S.A.I.M.M.

GUIDE TO THE PREPARATION OF PAPERS FOR PUBLICATION IN THE JOURNAL OF THE SOUTH AFRICAN INSTITUTE OF MINING AND METALLURGY

The following notes have been compiled to assist authors in the preparation of papers for presentation to the *Institute* and for publication in the *Journal*. All papers must meet the standards set by the Council of the Institute, and for this purpose all papers are referred to at least two referees appointed by Council.

STANDARDS FOR ACCEPTANCE

To merit consideration papers should conform to the high standards which have been established for publication over many years. Papers on research should contain matter that is new, interpretations that are novel or of new significance and conclusions that cast a fresh light on old ideas. Descriptive papers should not be a repetition of well-known practices or ideas but should incorporate developments which would be of real interest to technical men and of benefit to the mining and metallurgical industry.

In some cases a well prepared review paper can be of value, and will be considered for publication. All papers and particularly research papers no matter how technical the subject, should be written with the average reader of the *Journal* in mind, to ensure wide interest.

The amount of textbook material included in a contribution should be the minimum essential to the argument. The length of a paper is not the criterion of its worth and it should be as brief and concise as possible, consistent with the lucid presentation of the subject. Only in very exceptional circumstances should a paper exceed 15 pages of the *Journal* (15 000 words, if there are no tables or diagrams). Six to ten pages is more normal.

NOTE: Papers in the *Journal* are printed in 10 point type, which is larger than the 8 point type used on this page. For special publications Council may decide on page sizes smaller than A4 used for this *Journal*.

The text should be typewritten, double-spaced, on one side only on A4 size paper, leaving a left-hand margin of 4 cm, and should be submitted in duplicate to facilitate the work of the referees and editors.

LAYOUT AND STYLE

Orthodox sequence

Title and author's name, with author's degrees, titles, position.
Synopsis, including a brief statement of conclusions.
Index, only if paper is long and involved.
Introduction.
Development of the main substance.
Conclusions, in more detail.
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References.

Title: This should be as brief as possible, yet give a good idea of the subject and character of the paper.

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Collins, F. H., *Authors & Printers' Dictionary*—Oxford University Press.

Hart, H. *Rules for Compositors and Readers*. Humphrey Milford (familiarily known as the *Oxford Rules*).

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General: A few well selected diagrams and illustrations are often more pertinent than an amorphous mass of text. Over-statement and dogmatism are jarring and have no place in technical writing. Avoid the use of the first person, be objective and do not include irrelevant or extraneous matter. Avoid unnecessary use of capitals and hyphens, while punctuation should be used sparingly and be governed by the needs of sense and diction. Sentences should be short, uninvolved and unambiguous. Paragraphs should also be short and serve to separate basic ideas into compact groups. Quotation marks should be of the 'single' type for quotations and "double" for quoted matter within quotations.

Interpretations in the text should be marked off by parentheses (), whereas brackets [] are employed to enclose explanatory matter in the text.

Words to be printed in italics should be underlined *singly*. For small capitals they are to be underlined **DOUBLY** and for large capitals **TREBLY**.

If there is any problem in producing formulae accurately by

typewriter they should be inserted by handwriting in ink in the copy forwarded by authors.

Abbreviations and symbols are laid down in British Standard 1991. Abbreviations are the same for the singular and plural, e.g. cm for centimetre and centimetres, kg for kilogram and kilograms. Percentages are written in the text as per cent; the symbol % is restricted to tables. A full stop after an abbreviation is only used if there is likely to be confusion of meaning.

Metric System: The *Système International d'Unités* (S.I.) is to be used for expressing quantities. This is a coherent system of metric units derived from six basic units (metre, kilogramme, second, ampere, kelvin, and candela), from which are derived a other units, e.g. the unit of force is the newton (N) for kilogrammmetre per second per second (kg m/s^2). Always use the standard metric abbreviations.

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Numbering of tables should be in Roman numerals: I, II, etc. and figures in Arabic numerals: Fig. 1, Fig. 2, etc. (Always use the abbreviation for figure.) Photographs should be black and white glossy prints.

As a guide to the printer the author should indicate by means of notes in the typescript where tables and figures, etc. are to appear in the text.

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GENERAL

The Council will consider the publication of technical notes taking up to three pages (maximum 3 000 words).

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