



# Photon and Neutron Fluence-to-Dose Conversion Coefficients

An American National Standard

Published by the  
American Nuclear Society  
555 N. Kensington Ave  
La Grange Park, IL 60526



**ANSI/ANS-6.1.1-2020**

**American National Standard  
Photon and Neutron  
Fluence-to-Dose  
Conversion Coefficients**

Secretariat  
**American Nuclear Society**

Prepared by the  
**American Nuclear Society  
Standards Committee  
Working Group ANS-6.1.1**

Published by the  
**American Nuclear Society  
555 North Kensington Avenue  
La Grange Park, Illinois 60526 USA**

Approved September 10, 2020  
by the  
**American National Standards Institute, Inc.**

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**555 North Kensington Avenue**  
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## Foreword

(This foreword does not contain any requirements of American National Standard “Photon and Neutron Fluence-to-Dose Conversion Coefficients,” ANSI/ANS-6.1.1-2020, but is included for informational purposes.)

In 1977, the American Nuclear Society (ANS) published ANS-6.1.1-1977, “Neutron and Gamma-Ray Flux-to-Dose-Rate Factors,” which provided a standard method for computing dose equivalent values pertinent to the radiation protection of individuals exposed to externally incident neutron and gamma-ray flux. That standard, which was based on definitions and data from the National Council on Radiation Protection and Measurements, was in effect for 12 years. Later revisions led to the issuance of ANS-6.1.1-1991, which was based on new dosimetric quantities provided by the International Commission on Radiological Protection (ICRP) and the International Commission on Radiation Units and Measurements. ANS-6.1.1-1991 provided tables relating the fluence of gamma rays and neutrons to effective dose equivalents for radiation incident on mathematical anthropomorphic phantoms in five standard exposure geometries.

Despite its widespread use in shielding analysis and design, ANS-6.1.1-1991 was not maintained and was allowed to lapse by the Shielding Subcommittee. Recent new recommendations for dosimetric quantities in ICRP Publication 103 and the determination of these concepts using improved Monte Carlo transport codes and with realistic computational phantoms described in ICRP Publication 110 have culminated in ICRP Publication 116, “Conversion Coefficients for Radiological Protection Quantities for External Radiation Exposures.” That report also extends the areas of interest to other radiation types and to significantly higher energies. We have chosen to use the photon and neutron fluence to effective dose coefficients from ICRP Publication 116 as the basis of this standard, ANSI/ANS-6.1.1-2020. The coefficients for cranial and caudal irradiation geometries are taken from the coefficients reported by Veinot et al. coefficients using ICRP 116 methodology.

This standard does not incorporate the concepts of generating risk-informed insights, performance-based requirements, or a graded approach to quality assurance. The user is advised that one or more of these techniques could enhance the application of this standard.

This standard might reference documents and other standards that have been superseded or withdrawn at the time the standard is applied. A statement has been included in the references section that provides guidance on the use of references.

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