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## ISO-standards 14577 violate the first energy law: Can we further live with that?

The precise mathematical deduction from 2013 of the indentation work contribution that is lost for the penetration reveals that all the standards under ISO-14577 violate the first energy law. This concerns the definition of ISO-hardness and reduced modulus and also deduced further mechanical parameters. And also the recently published physical foundation of the experimentally validated (since 2003 by the author) exponent 3/2 on the depth h for pyramidal indentations, creates dilemma for industry and security agencies, while ISO still dictates exponent two in relation to the applied normal force FN, as in Sneddon-citing textbooks. They have to obey ISO standards with legal character, even though physics tells differently. Even NIST (US member of ISO) published six new mechanical parameters in a tutorial that continues distributing false physics using exponent two and energy-law violation. We must thus urgently try to change that situation, because falsely calculated mechanical properties severely harm all public in daily life, in medicine (implants), and techniques. Material's compatibilities (including solders) and mechanical stress are ubiquitous, to name a few. Material's failures have been claimed as fatigue of materials, rather than calculations against physics and violating the energy-law. Errors are also with finite element simulations always resulting with exponent two, not noticing phase transitions with their onset and energy, nor surface effects. These are only recognized when applying exponent 3/2, but not by polynomial curve fittings, or best exponent iterations. Almost all mechanical parameters require re-deduction on the basis of the correct exponent. ISO-hardness H and ISO-modulus Er are triply flawed: Violating energy law, false exponent and often unconscious characterization after phase transitions. All materials require genuine and reliable physical characterization! Thus, physical H, Er and other parameters (adhesion energy, etc.) must be deduced. This will be addressed upon, and unexpected applications will be presented.

### Biography

Gerd Kaupp studied Chemistry at University of Würzburg, Germany and completed his Post-doctoral studies at Albert Ludwigs University of Freiburg, where he appointed as an Associate Professor. He was appointed as Full Professor at University of Oldenburg in 1982. He guided a successful research group with various projects and cooperation with numerous industries and worldwide academic research groups. He served as Guest Professor for three international universities. He is now a retired member at University of Oldenburg. He has expertise in "Chemical kinetics, laser photochemistry, waste-free benign syntheses and productions, solid-state chemistry, reactive milling, mechanochemistry, atomic force microscopy AFM, scanning near-field optical microscopy SNOM, nano-scratching, nano-indentation, standardization in nano-mechanics and bionics".

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