



Standard Practice for Measuring Internal Rate of Return and Adjusted Internal Rate of Return for Investments in Buildings and Building Systems¹

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INTRODUCTION

The internal rate-of-return (IRR) and adjusted internal rate-of-return (AIRR) methods are members of a family of economic evaluation methods that provide measures of economic performance of an investment over time. Other methods in this family of evaluation methods are life-cycle cost analysis, net benefits and net savings analysis, benefit-to-cost and savings-to-investment ratio analysis, and payback analysis.

The IRR and AIRR methods are the topic of a single standard practice because they both measure economic performance as a compound yield on investment. The IRR is the compound rate of interest that, when applied as a discount rate to a project's stream of dollar benefits and costs, will equate them. The AIRR is the overall yield taking into account earnings on receipts reinvested to the end of the study period. The IRR or AIRR is compared against the investor's minimum acceptable rate of return (MARR), and the investment is considered economically attractive if the calculated yield exceeds the MARR. If an investment entails an initial outlay and a single receipt at the end of the study period, there is no difference between the IRR and the AIRR. But if cash flows occur over multiple time periods, the two will normally be different. This arises because the AIRR includes in its measure the return on reinvestment of receipts, whereas the IRR does not.

The AIRR is recommended for most applications in which a measure of yield is desired. Caution is recommended in applying either measure, however, because problems arise under certain conditions.

1. Scope

1.1 This practice covers a procedure for calculating and interpreting the internal rate of return (IRR) and adjusted internal rate of return (AIRR) measures in the evaluation of building designs, systems, and equipment.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appro-*

priate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:²

[E631 Terminology of Building Constructions](#)

[E833 Terminology of Building Economics](#)

[E917 Practice for Measuring Life-Cycle Costs of Buildings and Building Systems](#)

[E964 Practice for Measuring Benefit-to-Cost and Savings-to-Investment Ratios for Buildings and Building Systems](#)

[E1074 Practice for Measuring Net Benefits and Net Savings for Investments in Buildings and Building Systems](#)

[E1121 Practice for Measuring Payback for Investments in Buildings and Building Systems](#)

¹ This practice is under the jurisdiction of ASTM Committee [E06](#) on Performance of Buildings and is the direct responsibility of Subcommittee [E06.81](#) on Building Economics.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.