EFFICIENCY INDICATOR FOR ASSESSMENT OF WATER DISTRIBUTION NETWORKS CARRYING CAPACITY

Heber Gomes¹, Pedro Farias¹, Saulo Bezerra²*, Sabrina Corrêa²

¹Laboratory of Power and Hydraulics Efficiency in Water Supply Systems, Universidade Federal da Paraíba, CEP 58000-000, João Pessoa, PB, Brazil
²Department of Technology, Centre of Agreste Region, Universidade Federal de Pernambuco, CEP 55000-000, Caruaru, PE, Brazil

Abstract

A water distribution network’s (WDN’s) flow capacity decreases over time mainly because of the unplanned demand growth at its consumption points, increased water loss, and increased internal roughness caused by aging of pipes. In this context, this work presents a new performance indicator, the Carrying Capacity Indicator (ICC). It will enable utility managers to evaluate WDNs’ hydraulic and energy efficiency. The ICC was applied in a real case study: a sector of the João Pessoa WDN, in Brazil. Considering only design criteria (in relation to nodal demands and pipe roughness), the ICC decreased from 203.5% in the first year of the network’s operation to 70.6% in its 30th year of operation. Simulation results are provided to demonstrate that the proposed indicator can be successfully applied to a wider class of WDNs.

Key words: hydraulic efficiency, performance indicators, water supply networks

Received: February, 2019; Revised final: August, 2019; Accepted: November, 2019

* Author to whom all correspondence should be addressed: e-mail: s.bezerra@yahoo.com.br; Phone: +55 81 996083235.