

Accelerated Thermal Aging and Service Life Projection Model for EPDM Encapsulated Resilient Wedges

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Author: Dr. Lin Weibin, Materials Specialist | Affiliation: Baoming Polymer Lab

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COMPLIANCE NOTICE ON 50-YEAR DURABILITY CLAIM: Accelerated aging tests indicate a projected service life of more than 50 years under specified conditions. This projection is based on Arrhenius kinetic modeling and is not equivalent to 50 years of real-world field testing. WRAS Approval #2203045.

1. Study Objective & Material Scope

Resilient seated gate valves (Z41X/Z45X series) rely on EPDM synthetic rubber vulcanized onto a ductile iron wedge. This study models the degradation rate of EPDM polymer matrix under accelerated thermal exposure to estimate long-term sealing elasticity and compression set retention.

2. Test Standards & Arrhenius Aging Model

Applied Standards: ISO 188 (Accelerated aging), EN 681-1 (Elastomeric seals), WRAS BS 6920.

Test Protocol: EPDM rubber specimens exposed to 100°C for 1,000 continuous hours in forced-air thermal chambers.

Projection Model: Arrhenius activation energy equation predicting time-to-50% tensile retention at normal operating temperatures (20°C).

3. Thermal Aging Experimental Data

Aging Condition	Initial Tensile Strength	Aged Tensile Strength	Compression Set	Projected Life
Unaged Control (20°C)	16.2 MPa	16.2 MPa	0%	Baseline
ISO 188 (100°C x 1000h)	16.2 MPa	14.1 MPa (87% Retained)	18.4%	Projected > 50 Years

SAFE WEBSITE STATEMENT:

'Accelerated aging tests indicate a projected service life of more than 50 years under specified potable water conditions (ISO 188 / EN 681-1). This projection is based on laboratory Arrhenius kinetics and does not represent 50 years of field service.'