ISO 22762-2:2018 (E)

Elastomeric seismic-protection isolators — Part 2: Applications for bridges — Specifications

Contents

Foreword

Introduction

1 Scope

2 Normative references

3 Terms and definitions

4 Symbols

5 Classification

5.1 General
5.2 Classification by construction
5.3 Classification by tolerances on shear stiffness

6 Requirements

6.1 General
6.2 Type tests and routine tests
6.3 Functional requirements
6.4 Design compressive force and design shear displacement
6.5 Performance requirements
6.5.1 General
6.5.2 Compressive properties
6.5.2.1 General requirements
6.5.2.2 Test piece
6.5.2.3 Test conditions
6.5.3 Rotation properties
6.5.3.1 General requirements
6.5.3.2 Test piece
6.5.4 Shear properties
6.5.4.1 General requirements
6.5.4.2 Test piece
6.5.4.3 Test conditions
6.5.5 Tensile properties
6.5.5.1 General requirements
6.5.5.2 Test piece
6.5.5.3 Test conditions
6.5.6 Dependencies of shear properties
6.5.6.1 Shear-strain dependency
6.5.6.1.1 General requirements
6.5.6.1.2 Test piece
6.5.6.1.3 Test conditions
6.5.6.2 Compressive stress dependency
6.5.6.2.1 General requirements
6.5.6.2.2 Test piece
6.5.6.2.3 Test conditions
6.5.6.3 Frequency dependency
6.5.6.3.1 General requirements
6.5.6.3.2 Test piece
6.5.6.4 Repeated loading dependency
6.5.6.4.1 General requirements

6.5.6.4.2 Test piece
6.5.6.4.3 Test conditions
6.5.6.5 Temperature dependency
6.5.6.5.1 General requirements
6.5.6.5.2 Test piece
6.5.6.5.3 Test conditions
6.5.7 Shear displacement capacity
6.5.7.1 General requirements
6.5.7.2 Test piece
6.5.8 Durability
6.5.8.1 Ageing
6.5.8.1.1 General requirements
6.5.8.1.2 Test piece
6.5.8.2 Creep
6.5.8.2.1 General requirements
6.5.8.2.2 Test piece
6.5.9 Cyclic compressive fatigue properties
6.5.9.1 General requirements
6.5.9.2 Test piece
6.5.9.3 Test conditions
6.5.10 Reaction force characteristics at low-rate deformation
6.5.10.1 General requirements
6.5.10.2 Test piece
6.6 Rubber material requirements
6.6.1 General
6.6.2 Tensile properties
6.6.3 Properties after ageing in air
6.6.3.1 General requirements
6.6.3.2 Test conditions
6.6.4 Hardness
6.6.5 Adhesion properties
6.6.6 Compression set
6.6.7 Ozone resistance
6.6.8 Other properties
6.7 Dimensional requirements
6.8 Requirements on steel used for flanges and reinforcing plates

7 Design rules

7.1 General
7.2 Shape factor
7.2.1 First shape factor
7.2.2 Second shape factor
7.3 Compressive and shear properties
7.3.1 Compressive stiffness
7.3.2 Shear stiffness and equivalent damping ratio
7.4 Shear strain due to horizontal displacements
7.5 Total local shear strain
7.5.1 Local shear strain due to compressive force
7.5.2 Local shear strain due to compressive force
7.5.3 Total local shear strain
7.6 Tensile stress on reinforcing steel plates
7.7 Stability
7.7.1 Maximum compressive stress in non-seismic condition
7.7.2 Rotation performance check
7.7.3 Buckling check
7.7.4 Tensile stress on isolator
7.8 Force, moment and deformation affecting structures
7.8.1 Shear force affecting structures due to movement
7.8.2 Resistance to rotation
7.8.3 Compressive displacement due to compressive force
7.9 Design of fixings
7.9.1 External forces affecting joint members
7.9.2 Fixings and stresses to be checked
7.9.3 Allowable stress

8 Manufacturing tolerances

8.1 General
8.2 Measuring instruments
8.3 Plan dimensions of isolator body
8.3.1 Measurement method (see Figure 1)
8.3.2 Tolerances
8.4 Product height
8.4.1 Measurement method
8.4.2 Tolerances
8.5 Flatness of products
8.5.1 Measurement method
8.5.2 Tolerances
8.6 Horizontal offset
8.6.1 Measurement method
8.6.2 Tolerances
8.7 Plan dimensions of flanges
8.8 Flange thickness
8.9 Tolerances on positions of flange bolt holes

9 Marking and labelling

9.1 Information to be provided
9.2 Additional requirements
9.3 Marking and labelling examples

10 Test methods

11 Quality assurance

Annex A (normative) Tensile stress in reinforcing steel plate

A.1 Method for checking strength of reinforcing steel plate
A.2 Verification of Formula (A.1) by compressive failure testing of isolators
A.2.1 General
A.2.2 Test pieces
A.2.3 Test conditions
A.2.4 Test results

Annex B (normative) Buckling stability

Annex C (normative) Allowable tensile stress in isolator

Annex D (informative) Dependency of ultimate properties on shape factor

D.1 General
D.2 Specification of test pieces
D.3 Test conditions
D.4 Dependency of ultimate properties on shape factor

Annex E (informative) Minimum recommended tensile properties for rubber materials

Annex F (informative) Compressive stiffness

F.1 Compressive stiffness, Kv
F.2 Apparent Young's modulus, Ec
F.3 Empirical expressions for apparent Young's modulus, Ec

Annex G (informative) Determination of shear properties of elastomeric isolators

G.1 Shear properties of linear natural rubber bearings
G.2 Shear properties of high-damping rubber bearings
G.3 Shear properties of lead rubber bearings

Annex H (informative) Determination of local shear strain due to compression

Annex I (informative) Maximum compressive stress