AssaFlex

Bridge Components

Standard and differences between ASTM and EN on laminated bearing pads

1. Standards Involved

ASTM:

The relevant standards are ASTM A569/A569M for steel plates and ASTM D638, D412, or D395 for elastomer testing. More specifically, for laminated bearing pads, ASTM standards often refer to ASTM AASHTO M251 or similar for elastomeric laminated pads in bridge bearings.

EN (European Norms):

Laminated elastomeric bearings are covered by EN 1337 series:

EN 1337-3: Elastomeric bearings – laminated elastomeric bearings

EN 1337-5: Sliding bearings

2. Material Composition

ASTM:

Typically specifies steel layers and natural/synthetic rubber elastomer.

Steel thickness: generally, 2–4 mm per layer.

Rubber properties are often specified by tensile strength, elongation, and hardness.

EN:

Specifies low-carbon steel plates and an elastomer with specific Shore A hardness.

The EN standard is more prescriptive about lamination, bonding, and tolerances.

Also allows for steel with antioxidation coatings.

3. Design Criteria

Aspect ASTM EN 1337-3

Maximum pressure usually 25–50 MPa, depending on design. Specifies bearing stress limits based on rubber shear modulus

Movement accommodation. Typically handled by the geometry of the pad , EN calculates shear deformation explicitly

Temperature range Standard: -30°C to 60°C (may vary with rubber) EN: -40°C to 70°C (extended range options)

Creep & relaxation ASTM recommends testing for short-term load EN requires long-term load tests and aging tests

4. Testing Methods

ASTM:

Focus on tensile, compression, shear, and hardness tests.

Short-term and cyclic load testing.

EN:

Includes mechanical, dimensional, and environmental tests.

Durability tests: creep, aging, and low/high temperature performance are more rigorous.

Shear modulus measurement is a critical parameter.

5. Tolerances and Dimensions

ASTM: Gives general tolerances; usually ±0.5 mm or ±5% for thickness.

EN: Much more specific: exact tolerances for laminate thickness, flatness, and elastomer layer bonding.

6. Bonding Between Rubber and Steel

ASTM: Requires adhesion tests, but methods are less detailed.

EN: Very specific bonding tests, including peel tests and long-term durability under load.

Summary

ASTM:

More flexible and performance oriented.

Focus on material properties and short-term mechanical tests.

Often used in North America for bridges.

EN:

More prescriptive and detailed.

Includes long-term performance, creep, aging, and environmental tests.

Common in Europe, stricter on bonding and shear deformation limits.

If you want, I can make a side-by-side table comparing ASTM vs EN laminated bearing pads in every technical aspect, including material, load capacity, testing, tolerances, and temperature range. It makes it super clear for design or procurement decisions.

Aspect	ASTM Standards (e.g., AASHTO M251)	EN Standards (EN 1337-3)	Notes / Implications
Governing Standard	ASTM/AASHTO; references ASTM D638, D412, D395	EN 1337-3 (laminated elastomeric bearings)	ASTM is mostly US-centric; EN is European/International
Steel Laminates	Low carbon steel, thickness 2–4 mm, general tolerance ±5%	Low carbon steel, strict thickness & flatness tolerances; may include corrosion protection	EN more prescriptive on laminate quality & coating
Elastomer Type	Natural or synthetic rubber; focus on tensile, elongation, hardness	Elastomer with specified Shore A hardness; prescriptive material specs & bonding	EN requires specific long-term performance properties
Bonding	Adhesion testing recommended; less detailed	Peel tests, long-term durability tests under load	EN bonding tests are stricter; critical for long-life bridges
Design Stress / Load	Max compressive stress 25–50 MPa depending on application	Stress limits based on shear modulus; design considers long-term creep	EN emphasizes shear deformation and creep under sustained loads
Movement Accommodation	Based on pad geometry (translation + rotation)	Shear deformation of elastomer explicitly calculated	EN uses mechanical modeling for lateral displacement

Aspect	ASTM Standards (e.g., AASHTO M251)	EN Standards (EN 1337-3)	Notes / Implications
Temperature Range	Standard: ~ -30°C to 60°C	Standard: -40°C to 70°C; extended options available	EN covers wider environmental conditions
Creep & Long-Term Behavior	Short-term load & cyclic testing; long-term behavior less formalized	Long-term creep, aging, and environmental tests required	EN ensures predictable performance over decades
Testing Methods	Tensile, compression, shear, hardness, short-term load tests	Tensile, compression, shear, hardness, peel, creep, aging, environmental	EN testing is more rigorous & prescriptive
Dimensional Tolerances	General: ±0.5 mm or ±5%	Strict tolerances for total thickness, elastomer layers, and flatness	EN ensures interchangeability and uniform load distribution
Certification / Documentation	Manufacturer certification, ASTM test reports	CE marking possible, EN test report & type testing	EN is regulatory compliant for Europe; ASTM compliance is standard in US
Applications	Bridges, buildings; US-centric design codes	Bridges, buildings; Europe & international design codes	Both used in bridge engineering, but EN is stricter for critical long-term projects

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Bridge Components

ASTM vs EN | Standards for Laminated Bearing Pads

Governing Standard	ASTM standards (e.g., AASHTO), AASHTO M21	EN Standards (EN 1337-3)
Steel Laminates	ASTM/AASHTO: references ASTM D638, D412, D395	EN 1337-3 (laminated elastomeric bearings)
Elastomer Type	Low carbon steel, thickness 2-4 mm, general tolerance ±5%	Low carbon steel, strict thickness & flatness tolerances; may include corrosion protection
Bonding	Natural or synthetic rubber, focus on tensile, elongation, hardness	Elastomer with specified Shore A hardness; prescriptive material specs & bonding
Design Stress / Load	Adhesion testing recommended; less detailed	Peel tests, long-term durability tests under load
Movement Accommodation	Max compressive stress 25-50 MPa depending on application	Stress limits based on shear modulus; design considers long-term creep
Temperature Range	Based on pad geometry (tramslation + rotation)	Shear deformation of elastomer explicitly calculated
Creep & Long-Term Behavior	Short-term load & cyclic testing, long-term behavior less formalized	Long-term creep, aging, and environmental tests required