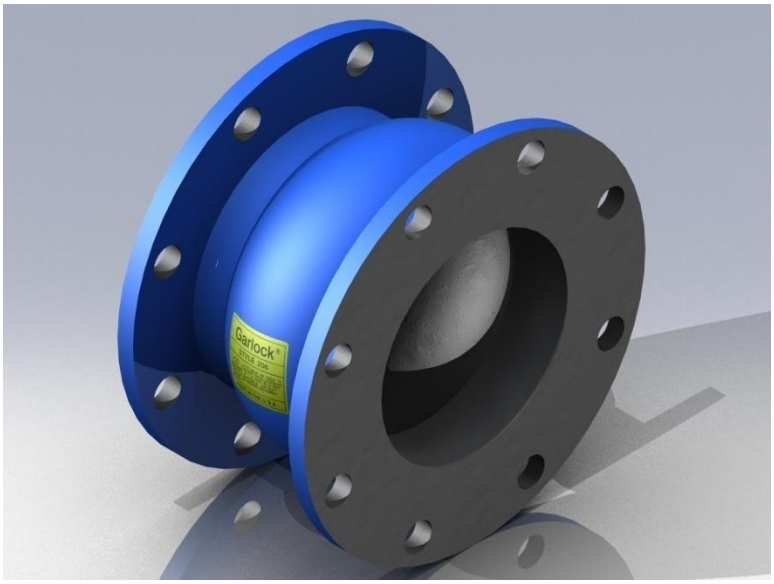
1.0 Application



The Style 206 is used in rigid piping systems to compensate for axial, lateral, torsional and angular movement and misalignment due to thermal expansion and contraction, mechanical effects, system settlement, pressure surges and system vibration. It is intended to be used in dynamic, high pressure applications where low spring rates and a self-flushing arch are required. The product can be specially designed and manufactured to compensate for permanent piping misalignment. This expansion joint prevents sediment build-up and provides high pressure capabilities, while providing lower spring rates.

2.0 Construction

The product construction shall include an elastomeric inner liner (tube) and consistent layers of fabric and metal reinforcement (body), bonded together with an elastomeric exterior cover. A protective coating shall be applied to the product exterior to impede deterioration due to environmental conditions.

2.1 Arch Profile

The width of the arch shall be a minimum four (4) times the height of the arch in order to create the self-flushing characteristics of the expansion joint.

2.2 Inner Elastomer Tube

The tube shall be a layer of homogeneous, elastomeric compound (1/8” minimum thickness) which is leak-proof and compatible with the conveyed media. The standard elastomer shall be chlorobutyl meeting ASTM D2000 Grade 4AA 610 A13 EA14.

2.3 **Fabric Reinforcement**

A minimum of 4 plies of high quality tire cord, impregnated with compatible elastomers are to be utilized to provide flexibility as well as durability. Standard fabric is to be nylon tire cord. The nylon tire cord shall meet the following specifications:

Specification	Method	Value
Thread Count: EPI-1 Direction (threads)	ASTM D3775	25 min
Gauge (Inch)	ASTM D1777	0.040 ± 0.005
Tensile Strength (lbs)	ASTM D5034	1000 min

2.4 **Exterior Elastomer Cover**

The cover shall be a homogenous layer of elastomeric compound (1/16" minimum thickness) to protect against environmental conditions or mechanical damage. The standard elastomer shall be chlorobutyl meeting ASTM D200 4AA 610 A13 EA14.

2.5 **Exterior Coating**

The cover of the expansion joint shall have an acrylic, blue paint coating exhibiting excellent weathering characteristics without hindering the product's flexibility. The coating shall be applied completely and uniformly.

3.0 **Retaining Rings**

Metal retaining rings shall be used with all expansion joints. Standard retaining rings shall be constructed of carbon steel and coated with a rust-resistant coating. Retaining rings shall be 3/8" thick and must be flat (not "L" shaped) to allow for full movements without damage to the elastomeric bellows. Alternative materials may include galvanized carbon steel and stainless steel.

4.0 **Control Units**

Control units consist of two or more tie rods (ASTM A193 B7) connected between flanges. The standard gusset plate material shall be ASTM A36 carbon steel. Control units are utilized to prevent over-elongation; thus prolonging the life expectancy of the expansion joint. When it is required, compression nuts may be installed on the tie rods to prevent over-compression of the expansion joint.

5.0 Variations

5.1 Offset

When pipe flange centerlines are not aligned or when flanges are non-parallel, an expansion joint can be manufactured with this offset to prevent stretching the joint at installation. This also allows the joint to move to its full rated movement during operation.

5.2 Sleeve Type

When pipes do not have flanges, a sleeve type joint can be used to slip over both ends of the piping. The ID of the expansion joint shall equal the pipe OD +1/8" (typically for ease of installation) and shall be used in conjunction with suitable t-bolt clamps. It is recommended to use an overlap of 2" minimum to clamp the expansion joint to the pipe OD. Sleeve type expansion joints do not follow standard pressure ratings of Style 206 expansion joints.

6.0 Operating Capabilities

All expansion joints shall conform to (but may exceed) the guidelines of the Rubber Expansion Joint Division of the Fluid Sealing Association as stated in the Technical Handbook.

6.1 Pressure Capabilities with 4:1 Burst Ratio at Standard Face-to-Face

Pipe ID		Pressure Rating @ 4:1 Safety Factor		Vacuum	
Inch	mm	psi	bar	In. Hg	mm Hg
2 – 10	50 – 250	250	17	26	650
12	300	250	17	12	300
14	350	130	9	12	300
16 – 20	400 – 500	110	8	12	300
22 – 24	550 – 600	100	7	12	300
26 – 40	650 – 1000	90	6	12	300
42 – 66	1050 – 1650	80	5.5	12	300
68 – 96	1700 – 2400	70	5	12	300
98 – 108	2450 – 2700	60	4	12	300
110 – 120	2750 - 3000	50	3.5	12	300

6.2 Vacuum Capabilities

See chart in Section 6.1.

6.3 Movement Capabilities

Pipe ID	Axial Compression	Axial Elongation	Lateral Deflection
2 – 5	3/4”	3/8”	1/2”
6 – 18	1”	1/2”	1/2”
20 – 24	1-1/8”	1/2”	1/2”
26 – 40	1-1/4”	1/2”	1/2”
42 & Up	1-3/8”	1/2”	1/2”

7.0 Material Variations

7.1 Tube Materials

The standard material for the tube shall be chlorobutyl. Alternative materials include EPDM, Nitrile, Neoprene, Fluoroelastomer, Natural Rubber, Natural Gum Rubber, Hypalon, HNBR and a High-Performance Fluoroelastomer.

7.2 Cover Materials

The standard material for the cover shall be chlorobutyl. Alternative materials include EPDM, Nitrile, Neoprene, Fluoroelastomer, Hypalon, HNBR and a High-Performance Fluoroelastomer.

7.3 Body Reinforcement Materials

The standard fabric reinforcement shall be nylon tire cord bonded to SBR. An alternative fabric is Kevlar Tire Cord bonded to chlorobutyl rubber.

7.4 Temperature Resistance

7.4.1 Standard Temperature Rating

The standard combination of a chlorobutyl tube and cover with nylon tire cord reinforcement is rated from -20°F up to 250°F.

7.4.2 300°F Temperature Rating

To achieve a 300°F temperature rating, a chlorobutyl or EPDM tube and cover is used with Kevlar tire cord reinforcement bonded to chlorobutyl.

8.0 Product Qualifications

8.1 10CFR50 Appendix B and 10CFR21 Safety Related

This expansion joint shall be able to be supplied as a "Safety Related" component in nuclear power plants per 10CFR50 Appendix B and 10CFR21.

8.2 ABS Approval

This style of expansion joint shall be approved by the American Bureau of Shipping (ABS) in accordance with 2010 ABS Rules for Steel Vessels, 2008 ABS MODU Rules and 2007 ABS Guide for Building and Classing High Speed Naval Craft.

8.3 Domestically Manufactured

All expansion joints shall be manufactured within the United States. All components within the expansion joints shall be manufactured within the United States of America.

9.0 Available Testing

9.1 Hydrostatic Testing

All expansion joints can be hydrostatically tested prior to shipment. The standard test shall use a pressure of 1.5 times the design pressure for a 10 minute period.

9.2 Vacuum Testing

All expansion joints can be vacuum tested prior to shipment. The standard test shall use a vacuum of 26" Hg for a 10 minute period.

9.3 Fabric Testing

Upon receipt of all fabric material, all tests specified in section 2.2 are to be performed to ensure conformance to internal specifications. All appropriate documentation shall be maintained indefinitely.

9.4 Elastomer Testing

All elastomers are to be tested to ensure their compliance with the necessary ASTM D2000 material description. All appropriate documentation shall be maintained indefinitely.

10.0 Manufacturer Qualifications

10.1 ISO Registration

The manufacturer of expansion joints shall have a current ISO 9001:2008 certification.

10.2 NUPIC Auditing

The manufacturer shall have undergone a positive performance audit by the Nuclear Procurement Issues Committee (NUPIC) in order to supply expansion joints in accordance with 10CFR50 Appendix B, 10CFR21 and NQA-1 Basic.

11.0 Field Services

The manufacturer shall be able to provide a range of on-site services including: field measurements, visual inspection of existing products in service, evaluation of piping misalignments to determine build dimensions for offset expansion joints, training seminars and installation supervision.