Fluid Sealing Association

STANDARD

FSA-DSJ-401-09
SPECIFICATION FOR
HIGH TEMPERATURE AND ACID RESISTANT
TERPOLYMER FLUOROELASTOMER

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This standard served as the basis for
ASTM International Standard D-6909.

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1. SCOPE

1.1 This specification provides requirements for the terpolymer fluorocarbon elastomer used in the manufacture of expansion joints for application in coal fired utility and other high temperature industrial applications where corrosive flue gases are present.

1.2 While the materials, methods, applications and processes described or referenced in this standard may involve the use of hazardous materials, this standard does not address the hazards which may be involved in such use. It is the sole responsibility of the user/tester to ensure familiarity with the safe and proper use of any hazardous materials and testing and to take the necessary precautionary measures to ensure the health and safety of all personnel involved.

2. REFERENCED DOCUMENTS:

2.1 *ASTM International:*

ASTM D-412	Rubber Properties in Tension
ASTM D-471	Rubber Property - Effect of Liquids
ASTM D-573	Rubber - Deterioration in an Air Oven
ASTM D-2240	Rubber Property - Durometer Hardness
ASTM D-297	Rubber Products - Chemical Analysis
ASTM D-1765	Standard Classification System for Carbon Blacks Used in Rubber Products

2.2 *Fluid Sealing Association:*

FSA DSJ-402-09 Fluoroelastomer Belt Recommendation

3. SIGNIFICANCE AND USE

This specification is intended as a reference procedure for evaluating the performance of vulcanizates based on terpolymer fluorocarbon elastomers used in expansion joints. It can be used for quality assurance testing prior to release of a lot based on agreement between supplier and purchaser.

4. MATERIAL REQUIREMENTS

4.1 Elastomer shall be 100% virgin fluoroelastomer terpolymer with a minimum of 68% by weight fluorine content. The compound shall contain no less than 70% by weight of the fluoroelastomer terpolymer. The remaining 30% by weight shall be comprised of Medium Thermal (MT) carbon black, ASTM designation N990, as reinforcing filler. No mineral fillers shall be used. The fluoroelastomer curative shall be either of the bisphenol (dihydroxy) or peroxide types. No amount of reprocessed fluoroelastomer scrap or non-fluoroelastomer polymer is acceptable.

4.1.1 Four products known to meet **4.1** are *DAI-EL™* , *Dyneon™ Tecnoflon*® and *Viton*® brands terpolymer fluoroelastomer products. Other equivalent fluoroelastomer terpolymers of at least 68% by weight fluorine content with equivalent curatives are acceptable.

4.2 As received virgin fluoroelastomer sampled in accordance with **Section 5.4** shall be fully pressure cured, typically for 20 minutes at 150°C (302°F), but not post cured. Other time/temperature conditions may be acceptable providing they produce vulcanizates that meet the property requirements. The samples' mean value for each measured property must meet the physical and chemical property requirements shown in Table 1.

TABLE I - PROPERTIES

PARAGRAPH	PROPERTY	REQUIREMENT	TEST METHODS
4.2.1	Hardness, Durometer Shore "A" or equivalent	77 ± 5	ASTM D-2240
4.2.2	Tensile Strength, Minimum	1015 psi (7-MPa)	ASTM D-412
4.2.3	Elongation, Minimum	275%	ASTM D-412
4.2.4	Density at 25 ± 0.5ºC	1.86 ± 0.04 g/cm^3	ASTM D-297
4.2.5	Methanol Volume Swell 70 ± 0.5 Hours at 23 ± 3ºC	30 % Maximum	ASTM D-471
4.2.6	Toluene Volume Swell 70 ± 0.5 Hours at 23 ± 3ºC	10 % Maximum	ASTM D-471

4.3 A sample shall be exposed to 260ºC (500ºF ± 5°) for 70 ± 0.5 hours *per ASTM*

D-573 and conform to the following property change requirements for Dry Heat Resistance:

4.3.1	Hardness Change Durometer Shore "A" or equivalent	±10 points
4.3.2	Tensile Strength Change, Maximum	+50 %
4.3.3	Elongation - Ultimate, Minimum	225 %
4.3.4	Weight Change,	±7%

4.4 The material color shall be black.

5. QUALITY ASSURANCE PROVISIONS

5.1 Quality

The product, as received, shall be uniform in quality and condition, smooth, as free from foreign materials as commercially practical, and free from imperfections detrimental to use as intended.

5.1.1 Responsibility for Inspection

The seller of the expansion joint shall be responsible for having all the required property tests performed. The buyer reserves the right to obtain additional batch samples and perform all confirmatory testing necessary to ensure the product conforms to the full requirements of this specification.

5.2 Classification of Tests

5.2.1 Acceptance Tests

The seller of the expansion joint shall be responsible for checking the batch sample test results, confirming that the results are in accordance with this specification and preparation of the "Batch Test Certification" report. The buyer reserves the right to perform confirmatory tests necessary to ensure that the product conforms to the "Batch Test Certification" and the full requirements of this specification.

TABLE II - ACCEPTANCE TESTS

PARAGRAPH	PROPERTY
4.2.1	Hardness, As Received
4.2.2	Tensile Strength, As Received
4.2.3	Elongation, As Received
4.2.4	Density, As Received
4.2.5	Methanol Swell, As Received
4.2.6	Toluene Swell, As Received
4.3	Hardness, Tensile & Density Changes & Ultimate Elongation after heat aging, As Received

5.2.2 Traceability

Shipments and certification with test values from test in Table II shall include traceability back to polymer, grade, and lot number.

5.3 Preproduction Tests

Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of the expansion joints to the buyer or when a change of ingredients and/or processing requires re-approval or when buyer deems confirmatory testing is required.

5.4 Sampling and Testing Shall Be As Follows:

5.4.1 For acceptance tests, sufficient product shall be taken at random from each lot to perform all required tests. The number of samples for each property tested per lot shall be no less than 3. A test result is the mean of the individual samples.

5.4.2 ASTM test specimens shall be prepared from the same batch of polymer/compound as the material being supplied and shall be fully pressure cured as specified in **4.2**.

5.4.3 A lot is the entire product from the same batch of compound processed in one continuous run and presented to the purchaser at one time.

5.4.4 A batch is the quantity of compound run through a mill or mixer at one time.

5.4.5 Ingredients and manufacturing processes used on specification test samples shall be the same as those on the approved product.

5.5 Reports

Report shall be furnished showing the test results on each lot to determine conformance to acceptance requirements. Documentation must include traceability back to polymer type, supplier, and supplier's lot number.

6. APPENDIX

DAI-EL ™ is a registered trademark of Daikin America Inc., a division of Daikin Industries.
Dyneon ™ is a registered trade name of Dyneon (a 3M Company).
Tecnoflon® is a registered trademark of Solvay Solexis, Inc.
Viton® is a registered trademark of DuPont Performance Elastomers, L.L.C.