ACETAL (POM) COPOLYMER, MELT FLOW RATE 0.7 - 4 — **WSK-M4D635-A1**

ACETAL (POM) COPOLYMER, MELT FLOW RATE 7 - 15 — **WSK-M4D635-A2**

ACETAL (POM) COPOLYMER, MELT FLOW RATE 23 - 35 — **WSK-M4D635-A3**

ACETAL (POM) COPOLYMER, MELT FLOW RATE 43 - 55 — **WSK-M4D635-A4**

1. SCOPE

The material defined by these specifications is a thermoplastic acetal copolymer based on trioxane with melt flow rates from 0.7 to 55 g/10 minutes.

2. APPLICATION

These specifications were released originally for materials used for functional automotive applications.

3. REQUIREMENTS

Material specification requirements are to be used for initial qualification of materials.

3.0 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.4 MOLDING COMPOUND

3.4.1 Melt Flow Rate, g/10 minutes
(ISO 1133/ASTM D 1238, 190 °C, 2.16 kg)

A1	A2	A3	A4
0.7 - 4	7 - 15	23 - 35	43 - 55

NOTE: For individual melt flow rates of approved materials see Corporate Approved Source List.

3.5 MOLDED TEST SPECIMEN

3.5.1 Preparation of Test Specimens

Unless otherwise specified all tests shall be carried out on injection molded one-end gated test specimens.

Date	Action	Revisions
2005 09 23	Revised	Inserted 3.0; Deleted 3.1, 3.2, 3.3, 3.7, 3.8 & 4
2000 11 28	Revised	Updated A. Cockman
1989 03 01	Released	SM/EQ2762 TP M. Siewert

Copyright Ford Motor Company
Provided by IHS Markit under license with FORD
No reproduction or networking permitted without license from IHS
Full document details: FORD WSK-M4D635-A3 2005
Printed copies are uncontrolled
Copyright © 2005, Ford Global Technologies, LLC
Licensee=/, User=,
Not for Resale,
Documents
Document Sharing Hub

The following dimensions are required:

A. 150 min x 10 x 4.0 +/- 0.2 mm (Tensile Bar, ISO 3167)

B. 120 x 10 x 4.0 +/- 0.2 mm

Specimens with shorter dimensions shall be cut from the center portion of the test specimen A and/or B. The specimens shall be prepared according to ISO 294. No annealing allowed.

3.5.2 Density, g/cm^3
(ISO 1183, Method A/ASTM D 792, Method A1)

A1	A2	A3	A4
1.38 - 1.43	1.38 - 1.43	1.38 - 1.43	1.38 - 1.43

3.5.3 Tensile Strength at Yield, MPa, min
(ISO R 527/ASTM D 638M, 150 min x 10 x 4.0 +/- 0.2 mm specimen, 50 mm/minute test speed)

A1	A2	A3	A4
60	60	60	60

3.5.3.1 Elongation at Break, %, min
(Test Method according to para 3.5.3)

A1	A2	A3	A4
25	20	15	15

3.5.4 Flexural Modulus, GPa, min
(ISO 178/ASTM D 790M, Method I, Procedure A, 80 x 10 x 4.0 +/- 0.2 mm specimen, 64 mm support span)

A1	A2	A3	A4
2.3	2.4	2.4	2.4

3.5.5 Shear Modulus at 23 °C, GPa
(ASTM D 4065, forced constant amplitude, fixed frequency of 1 Hz +/- 15%, strain level below 1%. Specimen approx. 60 x 10 x 4.0 +/- 0.2 mm cut from the center of specimen A.

Additionally, a Shear Modulus vs. Temperature curve shall be plotted for -50 to +150 °C temperature range, at 5 °C minimum intervals. The plotted curves must be within tolerance ranges shown on pages 5 (-A1), 6 (-A2), 7 (-A3), 8 (-A4).

A1	A2	A3	A4
0.78 - 1.17	0.87 - 1.31	0.88 - 1.33	0.91 - 1.36

Documents
Document Sharing Hub
Copyright Ford Motor Company
Provided by IHS Markit under license with FORD
No reproduction or networking permitted without license from IHS
Full document details: FORD WSK-M4D635-A3 2005
Printed copies are uncontrolled
Copyright © 2005, Ford Global Technologies, LLC
Licensee=/, User=,
Not for Resale,

3.5.6 Impact Strength, Izod, kJ/m2, min
(ISO 180, Method A/ASTM D 256, Method A, 63.5 x 10 x 4.0 +/-0.1 mm specimen, 10 specimens for each test)

3.5.6.1 At 23 +/- 2 °C

A1	**A2**	**A3**	**A4**
5.5	4.0	3.5	3.0

3.5.6.2 At - 40 +/- 2 °C

A1	**A2**	**A3**	**A4**
4.0	3.5	3.0	2.5

The test specimens must be conditioned for minimum of 6 h at the above specified temperature prior to impact test. Low temperature testing shall be done within the cold box. If not possible, the test can be conducted outside, but within 5 s.

3.5.7 Heat Deflection Temperature, °C, min
(ISO 75/ASTM D 648, 120 x 10 x 4.0 +/- 0.2 mm specimen)

3.5.7.1 At 1.82 MPa

A1	**A2**	**A3**	**A4**
90	95	95	95

3.5.7.2 At 0.45 MPa

A1	**A2**	**A3**	**A4**
135	140	140	140

3.5.8 Heat Aging Performance (A1 - A4)
(ISO 188/ASTM D 573, 1000 h at 140 +/- 2 °C. Unaged property values shall be determined at the time of the aged properties determination)

3.5.8 1	Tensile Strength Change, % (Test Method per para 3.5.3)	+/- 20
3.5.8.2	Impact Strength, Izod Change, % (Test Method per para 3.5.6.1, specimens to be notched before heat aging)	+/- 35

3.6 FLAMMABILITY (A1 - A4)
(ISO 3795)

Burn Rate, max 100 mm/minute

The specimen size required for material approval is 355 x 100 x 1.0 +/- 0.1 mm with a smooth surface.

Documents
Document Sharing Hub
Copyright Ford Motor Company
Provided by IHS Markit under license with FORD
No reproduction or networking permitted without license from IHS
Full document details: FORD WSK-M4D635-A3 2005
Printed copies are uncontrolled
Copyright © 2005, Ford Global Technologies, LLC
Licensee=/, User=,
Not for Resale,