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|  | European application engineering | |
| | LABORATORY TEST REPORT | |
| | ATR 2368 - Scapa 2702 FORD ES-AC3T- 1A303-AA Let.M specification (issue May 2015) | |
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1. OBJECTIVE Scapa 2702 in class B towards Ford ES-AC3T-1A303 AA LET M specification.

2. REFERENCE, DIMENSIONS AND BATCH NUMBER : 2702 black 33m x 19mm.

3. TYPE OF ASSEMBLY : 50% overlap.

4. PART IDENTIFICATION : ES-AC3T-1A303-AA (B10 Y 00).

5. EQUIPMENTS

Abrasion test machine according to ISO 6722-1 SCAPA N°1379.

Dynamometer MTS 2/M N° 1201 with sensor 100N N° 1217.

Sound dampening machine n°1309

Ventilated oven Climats XU250 N°1350 for fluid resistance tests.

Ventilated oven Climats XU250 n°1393 for heat ageing test.

Climatic chamber Excal 2213-HE N°1330.

0011 Fog – Test hart scientific VA-04

6. TEST CONDITIONS : 23 ± 2°C, and 50±5% of relative humidity.

7. REMARKS

Fluid resistance test: The liquid C is replaced by “SP95” unleaded petrol.

All the tests “ Bundling performance and material compatibility” are realised with


- Harness of 7 PVC FLRY-B (LF) 2.50 BR T2 COFICAB
- Harness of 7 PVC FLRY T2 LEONI Poland 2,5²

Fluids resistance, cold flexibility and flammability only with Harness of 7 PVC FLRY T2 LEONI Poland 2,5².


Cold flexibility: 0,5kg weight not used because harness is too stiff and replaced by the hand; The rate of wrapping is not specified, the rate of wrapping used is the rate specified in the Ford ED 1509 specification, 1 turn per 10s.

8. PERSONN IN CHARGE OF TEST AND FUNCTION Pierre Tissot, application engineering technician industrial Europe.


9. RESULTS

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| Test procedure | Tape criteria | units | Requirements | Roll | Measures | | | | | Result | Approval | Observation |
|----------------------------|--------------------------------|--------|--|------|----------|------|------|------|------|---|----------|---|
| ASTM D 1000 | Tensile strength | N/cm | > 15 | 1 | 31,3 | | | | | Min 26,7 Average 28,8N/cm | OK | |
| | | | | 2 | 27,3 | | | | | | | |
| | | | | 3 | 26,7 | | | | | | | |
| | | | | 4 | 27,3 | | | | | | | |
| | | | | 5 | 31,4 | | | | | | | |
| ASTM D 1000 | Elongation at break | % | > 125 | 1 | 247 | | | | | Min 169 Average 200% | OK | |
| | | | | 2 | 190 | | | | | | | |
| | | | | 3 | 169 | | | | | | | |
| | | | | 4 | 179 | | | | | | | |
| | | | | 5 | 215 | | | | | | | |
| EN 1939 -2003 Process 1 | Adhesion to steel after 1min | N/cm | ≥1,0 | 1 | 4,2 | | | | | Min 4,0 Average 4,1N/cm | OK | |
| | | | | 2 | 4,1 | | | | | | | |
| | | | | 3 | 4,2 | | | | | | | |
| | | | | 4 | 4,2 | | | | | | | |
| | | | | 5 | 4,0 | | | | | | | |
| EN 1939 -2003 Process 2 | Adhesion to backing after 1min | N/cm | ≥1,0 | 1 | 3,6 | | | | | Min 3,4 Average 3,5N/cm | OK | |
| | | | | 2 | 3,6 | | | | | | | |
| | | | | 3 | 3,4 | | | | | | | |
| | | | | 4 | 3,4 | | | | | | | |
| | | | | 5 | 3,5 | | | | | | | |
| § 7.11 ISO 6722-1 | Abrasion resistance | Cycles | < 100 : Class 0 100 – 499 : Class 1 500 – 999 : Class 2 1000 – 4999 : Class 3 > 4999 : Class 4 | 1 | 14 | 10 | 8 | 15 | 20 | Average 13 cycles | Class 0 | |
| | | | | 2 | 17 | 3 | 8 | 20 | 17 | | | |
| § 7.10 | Noise dampening (A) | dB | No requirements for Filmic Report class | 1 | 79,4 | 79,3 | 79,3 | 79,5 | 79,2 | Sound level without tape 79,8dB Average 79,3 A = 0,5dB | Class 0 | ≤ 2 : Class 0 >2 to ≤ 5 : Class 1 >5 to ≤ 10 : Class 2 >10 to ≤ 15 : Class 3 > 15 : Class 4 |
| | | | | 2 | 79,3 | 79,1 | 79,3 | 79,6 | 79,2 | | | |
| | | | | 3 | 79,2 | 79,3 | 79,3 | 79,4 | 79,4 | | | |
| | | | | 4 | 79 | 79 | 79,1 | 79 | 79,1 | | | |
| | | | | 5 | 79,4 | 79,7 | 79,7 | 79,5 | 79,4 | | | |

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| Test procedure | Performance criteria | Requirements | Sample | Measures | Result | Approval | Observation |
|---|--|---|--------|--|-------------------------------------|----------|-------------|
| Bundling performance and compatibility : Harness with 7 T2 2,5² wires PVC FLRY from Coficab | | | | | | | |
| § 7.3.1 | Initial testing | No cracking or flagging after bending around a 40mm diameter mandrel | 1 | No cracking or flagging | In accordance with the requirements | OK | |
| | | | 2 | | | | |
| § 7.3.2 7.3.5 6.1 | Environmental cycling | Bundling No cracking, melting, or degradation after bending around a 40mm diameter mandrel Flagging < 10mm Noticeable discoloration is not allowed Compatibility One wire from each specimen is then wrapped 2 times around a 2mm diameter mandrel. | 1 | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | OK | |
| | | | 2 | | | | |
| | | | 3 | | | | |
| | | | 4 | | | | |
| | | | 5 | | | | |
| § 7.3.4 7.3.5 6.1 | Thermal overload 6h at 150°C (service t° + 50°C) | The wire shall not exhibit any cracks, fractures or brittleness and shall not be swollen or shrunken. Discoloration of the line is not permitted. The original color shall still be visible. Adhesion performance Reduced adhesiveness is permitted. Total loss of adhesion is not permitted. Adhesive transfer to clean fingers is not permitted. | 1 | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | OK | |
| | | | 2 | | | | |
| | | | 3 | | | | |
| | | | 4 | | | | |
| | | | 5 | | | | |

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| Test procedure | Performance criteria | Requirements | Sample | Measures | Result | Approval | Observation |
|---|--|---|--------|--|-------------------------------------|----------|-------------|
| Bundling performance and compatibility : Harness with 7 T2 2,5² wires PVC FLRY from Leoni | | | | | | | |
| § 7.3.1 | Initial testing | No cracking or flagging after bending around a 40mm diameter mandrel | 1 | No cracking or flagging | In accordance with the requirements | OK | |
| | | | 2 | | | | |
| § 7.3.2 7.3.5 6.1 | Environmental cycling | Bundling No cracking, melting, or degradation after bending around a 40mm diameter mandrel Flagging < 10mm Noticeable discoloration is not allowed Compatibility One wire from each specimen is then wrapped 2 times around a 2mm diameter mandrel. | 1 | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | OK | |
| | | | 2 | | | | |
| | | | 3 | | | | |
| | | | 4 | | | | |
| | | | 5 | | | | |
| § 7.3.4 7.3.5 6.1 | Thermal overload 6h at 150°C (service t° + 50°C) | The wire shall not exhibit any cracks, fractures or brittleness and shall not be swollen or shrunken. Discoloration of the line is not permitted. The original color shall still be visible. Adhesion performance Reduced adhesiveness is permitted. Total loss of adhesion is not permitted. Adhesive transfer to clean fingers is not permitted. | 1 | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | OK | |
| | | | 2 | | | | |
| | | | 3 | | | | |
| | | | 4 | | | | |
| | | | 5 | | | | |

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| Test procedure | Performance criteria | Requirements | Time | Measures | Result | Approval | Observation |
|--|---|--|-------|--|-------------------------------------|----------------|-------------|
| Harness with 7 T2 2,5² wires PVC FLRY from Coficab | | | | | | | |
| § 7.3.3 7.3.5 6.1 | Heat ageing after 3000h at 100°C (service t°) | Bundling No cracking, melting, or degradation after bending around a 80mm diameter mandrel Flagging < 10mm Noticeable discoloration is not allowed Compatibility One wire from each specimen is then wrapped 2 times around a 2mm diameter mandrel. The wire shall not exhibit any cracks, fractures or brittleness and shall not be swollen or shrunken. Discoloration of the line is not permitted. The original color shall still be visible. Adhesion performance Reduced adhesiveness is permitted. Total loss of adhesion is not permitted. Adhesive transfer to clean fingers is not permitted. | 1500h | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | Class B | |
| | | | 2000h | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | | |
| | | | 2500h | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | | |
| | | | 3000h | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | | |

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| Test procedure | Performance criteria | Requirements | Time | Measures | Result | Approval | Observation |
|--|---|--|-------|--|-------------------------------------|----------------|-------------|
| Harness with 7 T2 2,5² wires PVC FLRY from Leoni | | | | | | | |
| § 7.3.3 7.3.5 6.1 | Heat ageing after 3000h at 100°C (service t°) | Bundling No cracking, melting, or degradation after bending around a 80mm diameter mandrel Flagging < 10mm Noticeable discoloration is not allowed Compatibility One wire from each specimen is then wrapped 2 times around a 2mm diameter mandrel. The wire shall not exhibit any cracks, fractures or brittleness and shall not be swollen or shrunken. Discoloration of the line is not permitted. The original color shall still be visible. Adhesion performance Reduced adhesiveness is permitted. Total loss of adhesion is not permitted. Adhesive transfer to clean fingers is not permitted. | 1500h | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | Class B | |
| | | | 2000h | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | | |
| | | | 2500h | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | | |
| | | | 3000h | Bundling Pass all the requirements without flagging Compatibility Pass all the requirements Adhesion performance Pass all the requirements | In accordance with the requirements | | |

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| Test procedure | Tape criteria | units | Requirements | Sample | Measures | Result | Approval | Observation |
|---|---|--------|---|--------|--|---|----------|--|
| § 7.5 | Cold flexibility after 4h at -25°C (<i>diameter mandrel 20mm</i>) Unwind speed 1 turn per 10 seconds | / | No cracking or degradation | 1 | No cracking or degradation | In accordance with the requirements | OK | Harness with 7 T2 2,5 ² wires PVC FLRY from Leoni |
| | | | | 2 | | | | |
| | | | | 3 | | | | |
| | | | | 4 | | | | |
| | | | | 5 | | | | |
| § 7.6 SAE J1756 | Fogging 3h at 100°C | / | > 20 | 5 | 24,0 | Min 19,8 Average 23,6 | OK | |
| | | | | | 27,1 | | | |
| | | | | | 19,8 | | | |
| § 7.7 ISO 3795 SAE J369 | Flammability | mm/min | < 100 | 1 | On the 5 samples the flame stops as soon as the Bunsen burner is removed | Burn rate 0mm/min Non combustible type A | OK | Harness with 7 T2 2,5 ² wires PVC FLRY from Leoni |
| | | | | 2 | | | | |
| | | | | 3 | | | | |
| | | | | 4 | | | | |
| | | | | 5 | | | | |
| § 7.8 SAE J1351 | Odor Dry Test on harness after 1h at 65°C | / | Maxi 2 for all interior applications | P1 | 1 | Maxi 2 | OK | SAE Classification 1: No noticeable odor 2: Slight, but noticeable odor 3: Definite odor, but no strong enough to be offensive 4: Strong offensive odor 5: Very strong offensive odor |
| | | | | P2 | 2 | | | |
| | | | | P3 | 1 | | | |
| § 7.8 SAE J1351 | Odor Wet Test on harness after 1h at 65°C | / | Maxi 2 for all interior applications | P1 | 1 | Maxi 2 | OK | |
| | | | | P2 | 2 | | | |
| | | | | P3 | 1 | | | |
| § 7.12 SAE J2192 §7.15 SAE J2302 | Thermal effectiveness | | Only required for tapes being used for thermal insulation | | N/A | | / | <i>Tape not used for thermal insulation</i> |

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| Test procedure | Performance criteria | Requirements | Time | Measures | Result | Approval | Observation |
|---|---------------------------|---|--|--|-------------------------------------|----------|-------------|
| § 7.4 Note: Tapes used in the interior of the vehicle or in designated “dry” areas are exempt from this test | Fluid resistance | Bundling No cracking, melting, or degradation. Flagging < 10mm Adhesion performance Reduced adhesiveness is permitted. Total loss of adhesion is not permitted. Adhesive transfer to clean fingers is not permitted. | Harness with 7 T2 2,5² wires PVC FLRY from Leoni | | | | |
| | Battery acid at 23°C | | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |
| | Windshield washer at 23°C | | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |
| | Engine coolant at 90°C | | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |

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| Test procedure | Performance criteria | Requirements | Time | Measures | Result | Approval | Observation |
|---|--|--|--|--|-------------------------------------|----------|-------------|
| § 7.4 Note: Tapes used in the interior of the vehicle or in designated “dry” areas are exempt from this test | Fluid resistance Brake fluid at 23°C | Bundling No cracking, melting, or degradation. Flagging < 10mm | Harness with 7 T2 2,5² wires PVC FLRY from Leoni | | | | |
| | | | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |
| | Unleaded petrol “SP95” at 23°C | Adhesion performance Reduced adhesiveness is permitted. Total loss of adhesion is not permitted. Adhesive transfer to clean fingers is not permitted. | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |
| | Diesel at 23°C | | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |

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| Test procedure | Performance criteria | Requirements | Time | Measures | Result | Approval | Observation |
|---|---|--|--|--|-------------------------------------|----------|-------------|
| § 7.4 Note: Tapes used in the interior of the vehicle or in designated “dry” areas are exempt from this test | Fluid resistance Ethanol 85 at 23°C | Bundling No cracking, melting, or degradation. Flagging < 10mm | Harness with 7 T2 2,5² wires PVC FLRY from Leoni | | | | |
| | | | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |
| | Transmission fluid at 90°C | Adhesion performance Reduced adhesiveness is permitted. Total loss of adhesion is not permitted. Adhesive transfer to clean fingers is not permitted. | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |
| | Power steering fluid at 90°C | | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |

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| Test procedure | Performance criteria | Requirements | Time | Measures | Result | Approval | Observation |
|---|--|--|--|--|-------------------------------------|----------|-------------|
| § 7.4 Note: Tapes used in the interior of the vehicle or in designated “dry” areas are exempt from this test | Fluid resistance (except type A) | Bundling No cracking, melting, or degradation. Flagging < 10mm | Harness with 7 T2 2,5² wires PVC FLRY from Leoni | | | | |
| | Engine oil at 90°C | | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |
| | Engine cleaner at 23°C | Adhesion performance Reduced adhesiveness is permitted. Total loss of adhesion is not permitted. Adhesive transfer to clean fingers is not permitted. | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |
| | Salt spray at 23°C | | 24h at 23°C | Pass all the requirements without flagging | In accordance with the requirements | OK | |
| | | | 48h at 23°C | Pass all the requirements without flagging | | | |
| | | | 72h at 23°C | Pass all the requirements without flagging | | | |