

No. SCA\_300\_049

## Seat Belt test Tensile test according to manufacturer's specification

### ■ Purpose and Definition:

The three point seat belt design, created by VOLVO in 1959, has saved approximately 1 000 000 lives worldwide since then. Tensile tests are a fundamental test within material science and is performed on more or less all materials. For seat belt manufacturers it's of great importance to perform continuous quality control on the products they produce to ensure that the final product is according to specification and will withstand the forces, which occurs during an accident and again saving a life...

### ■ Equipment used:

**Testing machine:** AG-100kNX with protective doors for camera.  
**Load cell:** 100kN, 1/1000 Class 0,5  
**Jig:** 100kN belt grips.  
**Extensometer:** TRViewX single camera for protective doors, FOV 500 mm  
**Software:** Trapezium-X Single / Tensile.  
**Environment:** Room temp 21° +/- 2°C, humidity ca. 50 +/- 5% RHT  
**Test execution:** 5 samples was prepared.

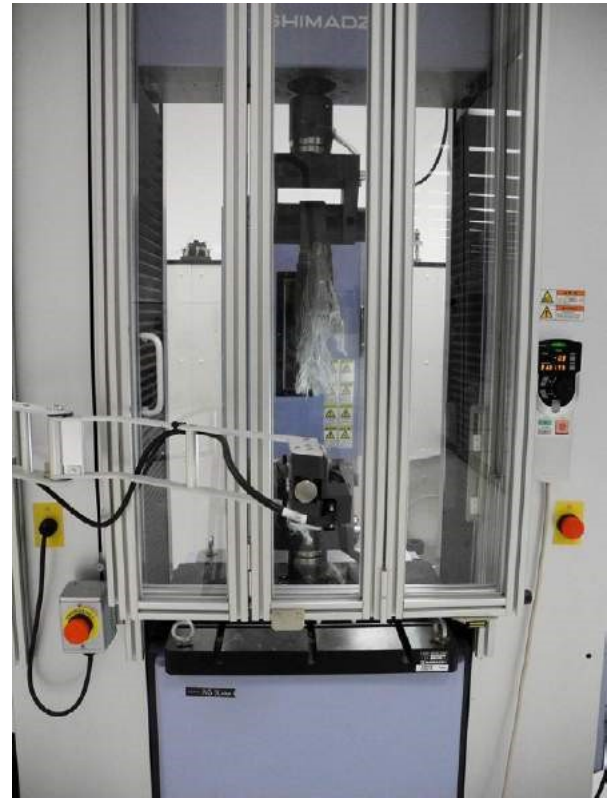
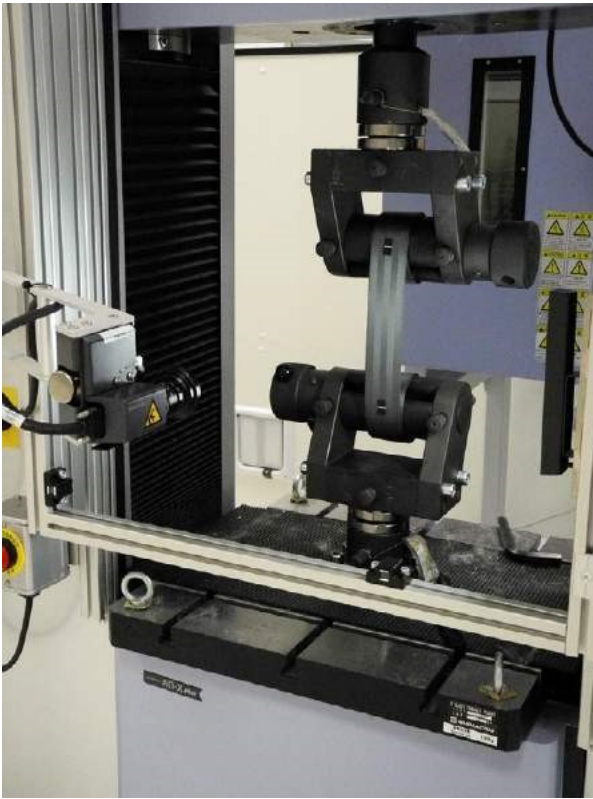
Sample length has to be long enough to be rolled on the grips and ensure a secure gripping.

In this case the total sample length was approximately 1200 mm.

There must still be enough grip separation to set the gauge length...

A method is prepared according to customer request. Test type is single and tensile. Test speed is set to 20 mm/min Gauge length is 200 mm and the TRViewX was selected as extensometer because of the sample dimensions and the violent break properties. Some data points that are requested in this test are: Elongation at 980 daN, 1000 daN, 1110 daN and 1130 daN. Break elongation in %. Maximum force in daN. With the help of TrapeziumX all requested parameters are set quickly with a few clicks exactly according to the specification.





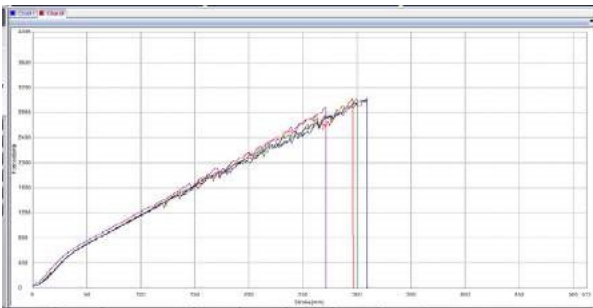
■ Test Results:

Tensile properties are always important in most materials and is the most common test made in universal testing machines. Generally, a customer is looking for elastic, maximum and break properties.

The fact that seat belts are tested we all understand very well and like in the measurements, purpose is to find out material strength and tensile properties at different loads.

Examples of applicable standards:

ASTM D6775 Test Method for Breaking Strength and Elongation of Textile Webbing, Tape and Braided Material



Results(Batch)						
Name	Max. Force	980 Ext1(Strain)	1000 Ext1(Strain)	1110 Ext1(Strain)	1130 Ext1(Strain)	Break Ext 1(Strain)
Parameter	Calc. at Entire Area	Force 980 daN	Force 1000 daN	Force 1110 daN	Force 1130 daN	Sensitivity: 10
Pass/Fail						
Unit	daN	%	%	%	%	%
Plint						
Bel 1	✓ 3011.03	9.61522	9.94517	11.1213	11.2647	21.4502
Bel 3	✓ 3027.53	9.75866	10.0505	11.2209	11.3641	22.4308
Bel 5	✓ 2883.12	9.73363	9.97919	11.2152	11.4386	21.3322
Bel 7	✓ 3004.81	9.69150	9.93767	11.1725	11.3387	22.0457
Bel 9	✓ 2987.14	9.77825	10.0417	11.2215	11.4175	22.4387
Average	2982.73	9.71546	9.96565	11.1909	11.3581	21.3375
Standard Deviation	57.5262	0.06473	0.07722	0.04243	0.06088	0.52670
Maximum	3027.53	9.77825	10.0505	11.2215	11.4356	22.4387
Minimum	2883.12	9.61522	9.94517	11.1743	11.2647	21.3922
Range	144.410	0.16303	0.20133	0.09720	0.15080	1.11650
Median	3004.81	9.73363	9.97919	11.2152	11.3641	22.0457
Variation	0.019229	0.00666	0.00775	0.00379	0.00536	0.02415

