

Application News

No. **i287**

Material Testing Machines

Fabric Tear Test (JIS L1096 Single Tear Method)

People wear different types of clothing every day to match the season, time of day, and setting. Highly breathable T-shirts are worn on hot summer days and down jackets with excellent warmth retention properties are worn on cold winter days. People doing physical labor wear work clothes made of durable fabric that allows freedom of movement. Depending on the feature that takes priority, such as comfort, functionality, or design, different performances are needed and new clothes are being created every day according to such requirements.

Woven products must undergo strength evaluation to ensure they meet a certain level of quality. JIS L1096 (2020) describes various techniques for evaluating woven and knitted fabrics that are an essential part of our daily life; these include test methods to measure not only breaking strength and tearing strength, but also air permeability and warmth retention. JIS L1096 (2020) specifies five different tearing test methods: method A (single tongue method), method B (double tongue method), method C (trapezoid method), method D (pendulum method), and method E (ISO pendulum method).

This article describes an example case in which fabric tear testing was performed by JIS L1096-2 trouser-shaped test specimens (single tear method).

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■ Measurement System

The test configuration is shown in Table 1. Measurements were taken on an AGS-X table-top type universal testing instrument using pneumatic flat grips and single file teeth grip faces to prevent slippage during testing. The test conditions are shown in Table 2. Method A includes method A-1 suitable for knitted fabrics and method A-2 primarily used in tests of woolen fabrics. Specimens for Method A-1 were prepared by cutting out specimens of approx. 50 mm × 250 mm or approx. 100 mm × 250 mm and making a 100-mm longitudinal slit in the test specimen in the center of the shorter side of the specimen (Fig. 1). The two legs of fabric of the cut were secured in the upper and lower grips in order to form a right angle with the grip face edge (the grip face width must be larger than the legs of the specimen). The maximum test force measured during the test was taken as the tearing strength.

The test setup is shown in Fig. 2. Two types of specimen were prepared; one with its length parallel to the warp and the other with its length parallel to the weft.

Table 2 Test Conditions

Test speed	100 mm/min
Specimen dimensions	Width 50 mm × length 250 mm 100-mm cut placed at a right angle to the specimen edge, in the center of the shorter side of the specimen
Specimen fabrics	(1) Gingham cloth (2) Costume satin cloth (3) Cotton cloth (4) Back satin cloth
No. of tests	n=3

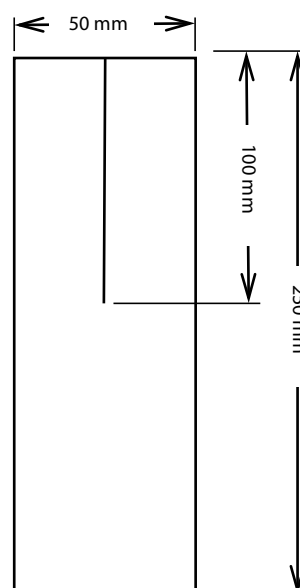


Fig. 1 Test Specimen

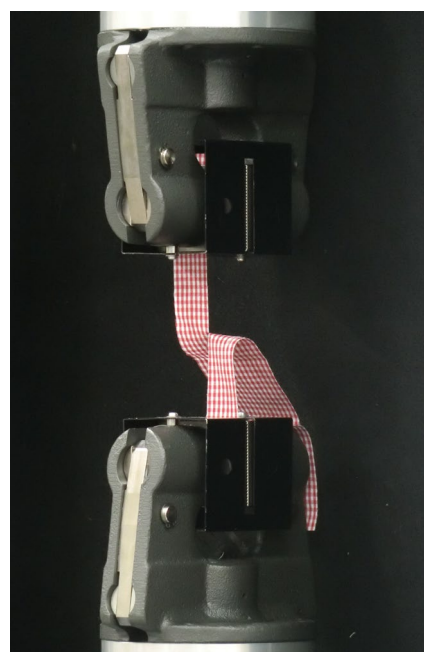


Fig. 2 Test Setup

Table 1 Equipment Configuration

Universal testing machine	AGS-X
Load cell	5 kN
Grips	5 kN pneumatic flat grips
Grip faces	Single file teeth grip faces
Software	TRAPEZIUM™ X (Single)

■ Test Results

Examples of test results are shown in Fig. 3. Specimens with length parallel to the warp were used to determine the tearing strength across the weft, and specimens with length parallel to the weft were used to determine the tearing strength across the warp. The test could be conducted smoothly without slippage of any specimen. A summary of the test results is shown in Fig. 4. The results showed a large difference between tearing strength across the weft and across the warp for specimens (1), (3), and (4) and a small difference for specimen (2).

■ Summary

A table-top type universal testing instrument was used to perform a fabric tearing test (single tongue method) that conformed to JIS L1096. This Shimadzu test system can be used to evaluate fabric strength.

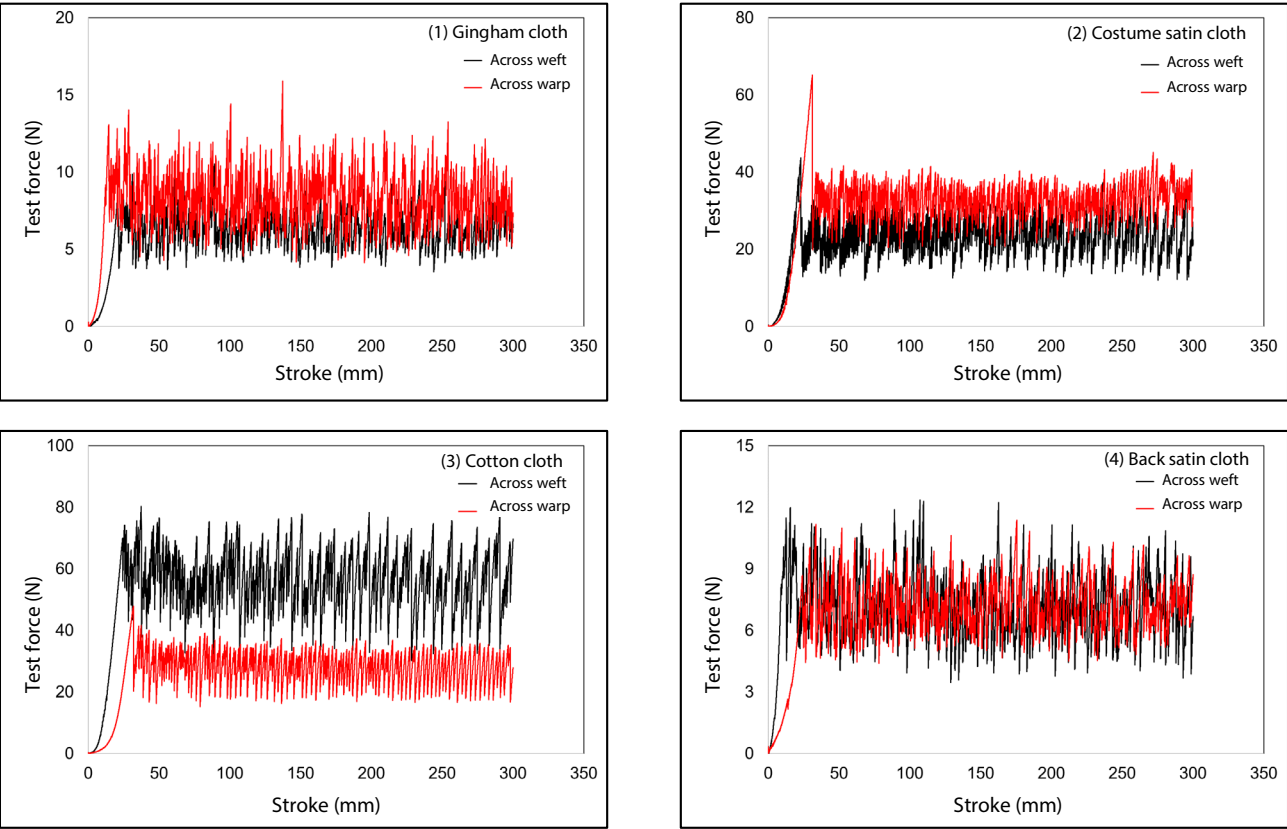


Fig. 3 Test Results

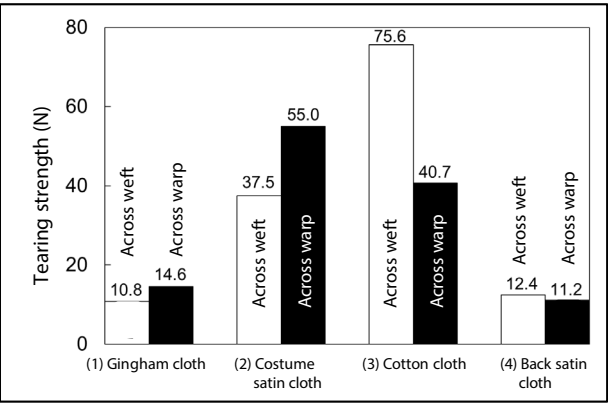


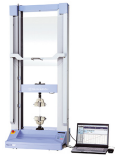
Fig. 4 Summary of Test Results (Mean Values, n = 3)

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