Three-Tier Scaffolding Frame Compression Tests

SWS-610B Series

For

Southwest Scaffolding
5030 Dexham Rd., Ste. 102
Rowlett, TX 75088

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By

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Notice

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Summary

This report summarizes load test results for 20 ft. 2 in. vertical scaffolding towers. Ultimate load carrying capacities of the scaffolding towers are provided. For the three scaffolding towers tested, which all failed by global buckling, the average ultimate load carrying capacity was 40,300 lbf.

1. Introduction

Load tests were performed on scaffolding towers at the request of Southwest Scaffolding of Rowlett, TX. The tests were performed at the Structural and Materials Testing Laboratory of the Zachry Department of Civil Engineering at Texas A&M University, College Station, Texas. This report covers one series of scaffolding towers that are manufactured for Southwest Scaffolding and are designated as SWS-610B. Each scaffolding tower series was tested at the height specified in Table 1. A total of 3 tests were performed on April 25, 2017. A dimensional drawing of the frame provided by the manufacturer for the tested series is shown in Figure 1.

Table 1: Summary of test series

Series	Plan Dimensions	Test Height (ft)
SWS-610B	5 ft wide x 7 ft long	20.17

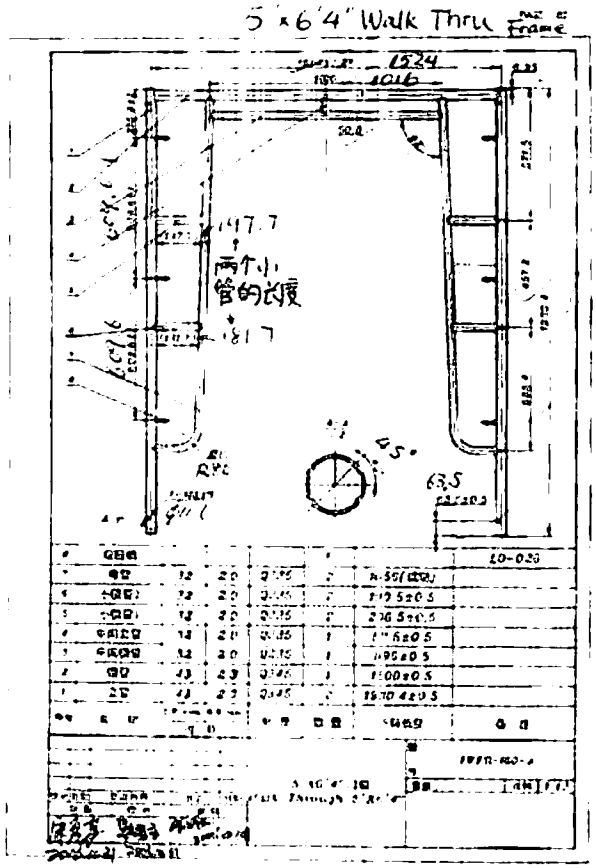


Figure 1: Dimensional drawing of scaffolding frame provided by the manufacturer.

2. Test Program

2.1. Specimen Setup

The scaffolding towers were tested in the high bay facility of the Structural and Materials Testing Laboratory of the Zachry Department of Civil Engineering, Texas A&M University, College Station, Texas. The scaffolding tests were performed according to ANSI/SSFI SC100-5/05.

Loading of each scaffolding tower was accomplished using four hydraulic load rams which were pressurized through a single manifold. Pressure was increased manually using a hand pump while continuously monitoring the summation of the readings from load cells attached to each load ram. An H-shaped spreader frame was used to mount the hydraulic rams above the individual tower legs. The spreader frame has nominal plan dimensions of 5 ft. by 7 ft. and the rams were adjusted to the 5 ft. by 7 ft. positions prior to testing.

Each 3-tier scaffolding tower was first fully assembled and then moved into position under the spreader frame. The lower screw jacks of each tower rested on the laboratory concrete strong floor. The scaffolding tower was then adjusted using the lower screw jacks so that each leg was vertical and aligned with the load ram above. Figure 2 shows the test setup with the specimen in position prior to the application of load. It should be noted that the load frame, as shown in Figure 2, provides sufficient lateral restraint to minimize sidesway during buckling.

Loading was consistently applied at a load rate of between 5,000 lb. and 10,000 lb. total load per minute until failure occurred. The average load rate for the three tests was 6000 lbf per minute.

Figure 2: Photo of test setup with specimen in place.

2.2. Instrumentation

The instrumentation for the test program consisted of four load cells, each mounted to a load ram positioned above each tower post. These load cells were scaled, prior to the test program, to the data acquisition system and together were verified "as a system" using an ASTM E74-13a calibrated, NIST - traceable load cell. Data were continuously recorded through the duration of the load test at a scan rate of 1 Hz using a National Instruments® data acquisition system and software (LabVIEW®).

3. Results

Table 2 provides a summary of results for the three tests of the scaffolding towers. In general, the failure mode for all tests was sudden buckling, with little or no warning. Figure 3 shows the buckled configuration for Specimen 1. Measured leg loads versus time are plotted for all scaffolding frames and are given in the Appendix.

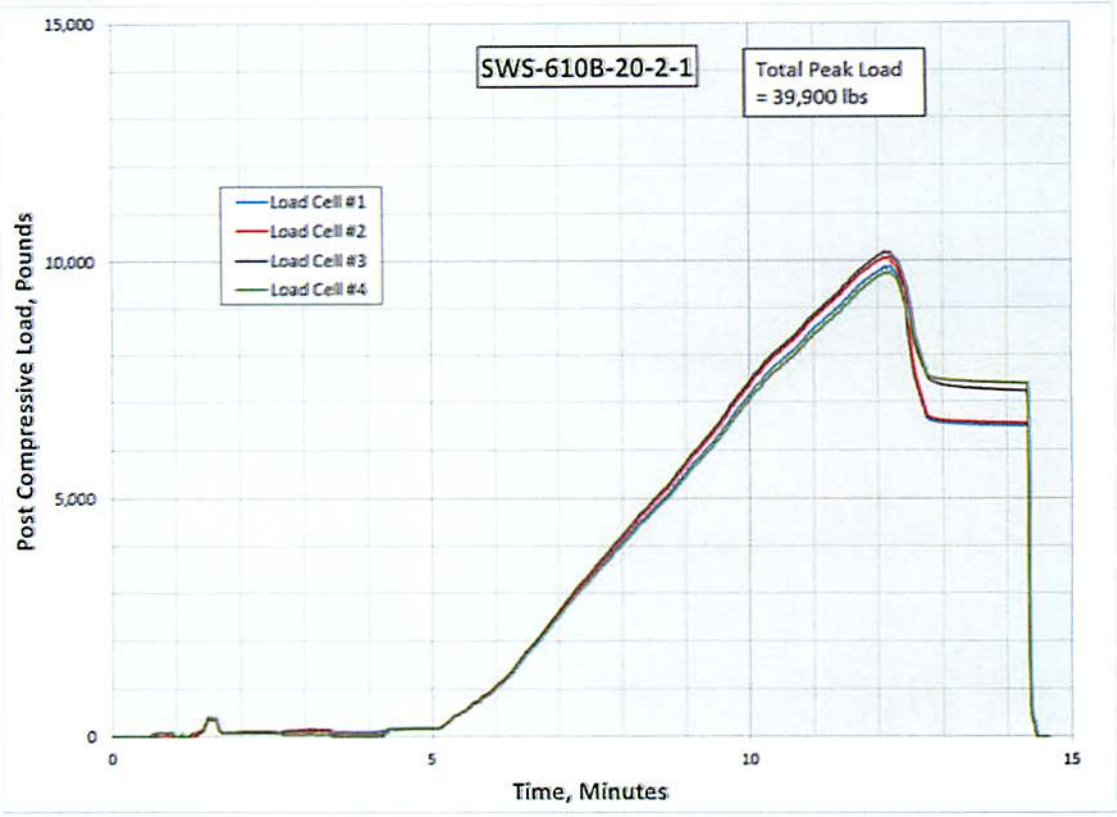
Table 2: SWS-610B

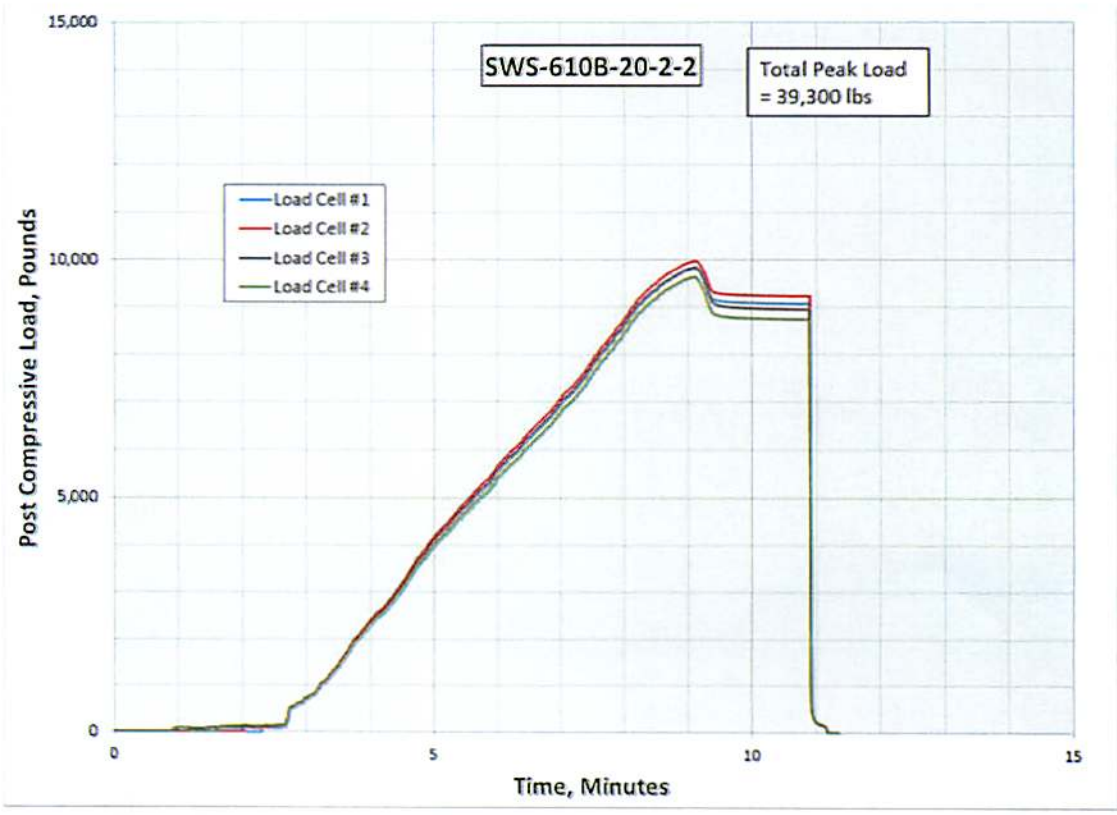
Test ID	Total Ultimate Load (lbf)	Failure Mode
SWS-610B-1	39,900	Global Buckling
SWS-610B-2	39,300	Global Buckling
SWS-610B-3	41,600	Global Buckling

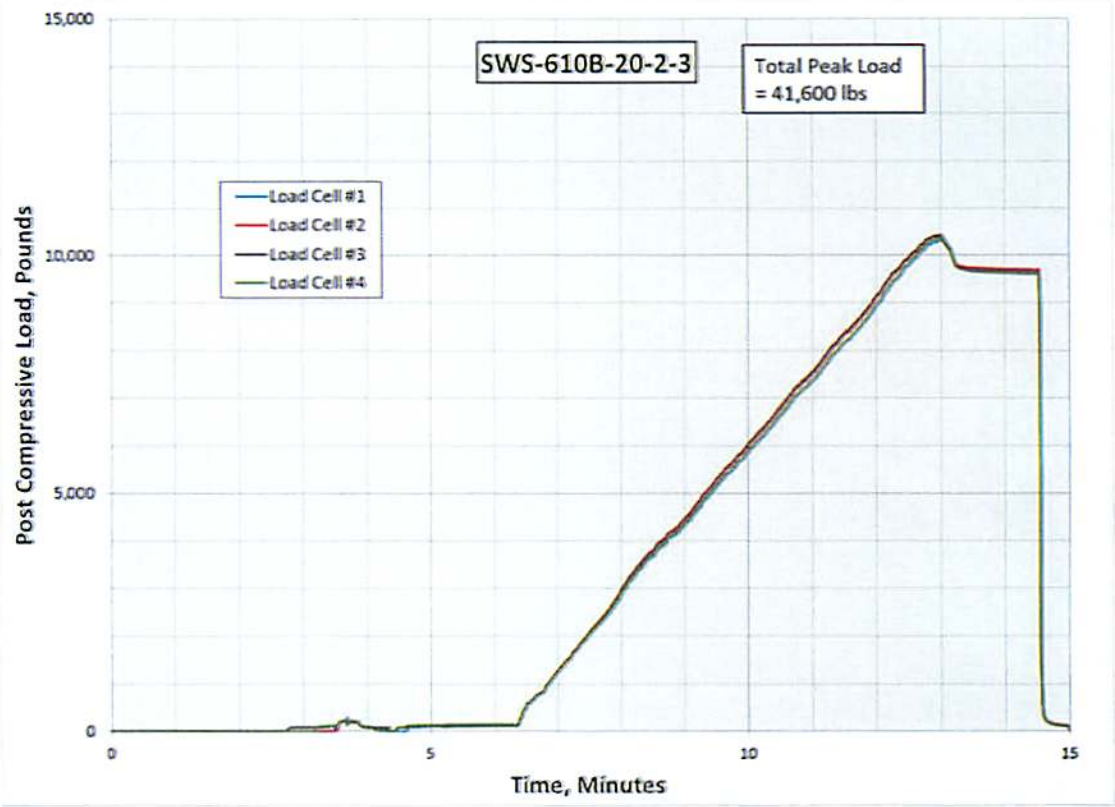
	Test 1-3	Tests 1-4	Test 1-5
Average Ultimate Load	40,300	N.A.	N.A.
Maximum Variation	3.2% at Test 3	N.A.	N.A.

Figure 3: Buckled configuration of Specimen 1

Appendix


SWS-610B-20-2-1
Total Peak Load
= 39,900 lbs
Load Cell #1
Load Cell #2
Load Cell #3
Load Cell #4
Post Compressive Load, Pounds
15,000
10,000
5,000
0
0
5
10
15
Time, Minutes


SWS-610B-20-2-2
Total Peak Load
= 39,300 lbs
Load Cell #1
Load Cell #2
Load Cell #3
Load Cell #4
Post Compressive Load, Pounds
15,000
10,000
5,000
0
0
5
10
15
Time, Minutes


SWS-610B-20-2-3
Total Peak Load
= 41,600 lbs
Load Cell #1
Load Cell #2
Load Cell #3
Load Cell #4
Post Compressive Load, Pounds
15,000
10,000
5,000
0
0
5
10
15
Time, Minutes