



**ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF CIVIL ENGINEERING
CIVIL ENGINEERING DEPARTMENT**

**“ABS Plus Disposable Formwork” for Filling Applications developed
by ABS BUILDING MATERIALS IND. TRADE CO. LTD.
loading tests**

TECHNICAL REPORT

Bu rapor, İ.T.Ü. Döner Sermaye İşletmesi kapsamında aşağıda ismi yazılı öğretim üyesi tarafından hazırlanmıştır.

Prepared by

Özkan ŞENGÜL
Associate Prof. Dr.

Koray M. ARSLAN
Civil Engineer Msc.

ITU Faculty of Civil Engineering
Civil Engineering Department

ITU Faculty of Civil Engineering
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İ.T.Ü.	
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ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF CIVIL ENGINEERING
CIVIL ENGINEERING DEPARTMENT
34469, Maslak, ISTANBUL

10.09.2018

ABS YAPI ELEMANLARI SAN.TİC. LTD. ŞTİ.
İstanbul

Subject: Loading tests on plastic disposable formworks were requested in your application letter. The tests were performed on disposable formworks having different heights and results are given below.

1- INTRODUCTION:

In the application letter of ABS Building Materials Ind. Trade Co. Ltd.; it was mentioned that the company is producing plastic disposable formworks with the brand “ABS Plus Disposable Formwork” and it was requested to perform loading tests on these plastic disposable formworks which have different heights. As a first test, tensile tests were performed to determine material properties of plastic samples which are cut-out from plastic disposable formworks produced by ABS Ltd. Then loading tests were performed on the disposable formwork systems which are prepared by the company in advance. Loading tests were done in a construction site that belongs to Koyaş Otomotiv Sanayi, in Başiskele - Kocaeli.

2- Tensile Tests of Plastic Disposable Formwork

Bow-tie shaped samples were cut-out from plastic formworks for tensile testing. The tests were performed in ITU Construction Materials Laboratory using a 50 kN capacity of MTS tensile test device. The results are shown in the table below.

Table 1. Tensile Test Results

Sample No	Width (mm)	Thickness (mm)	Maximum Load (N)	Tensile Strength (MPa)	Total Elongation (%)	Modulus of Elasticity (MPa)
1	6,20	1,71	243,6	23,0	24,3	1272
2	6,20	1,70	252,7	24,0	25,4	1266
3	6,48	1,71	263,6	23,8	24,3	1286
4	6,33	1,70	245,8	22,8	29,4	1154
5	6,50	1,70	249,8	22,6	25,0	1229

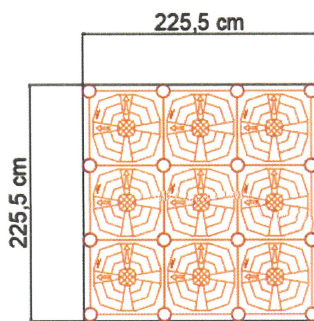
Note 1: Loading pace is 10 mm/min.

Note2: While calculating values of total elongation and modulus of elasticity, displacement of jaws of the tensile test device was considered.

3- Loading Test Results of Plastic Disposable Formworks

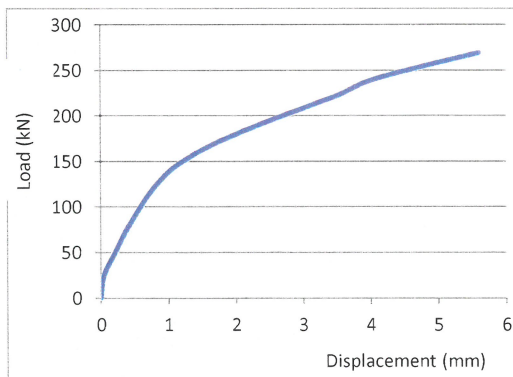
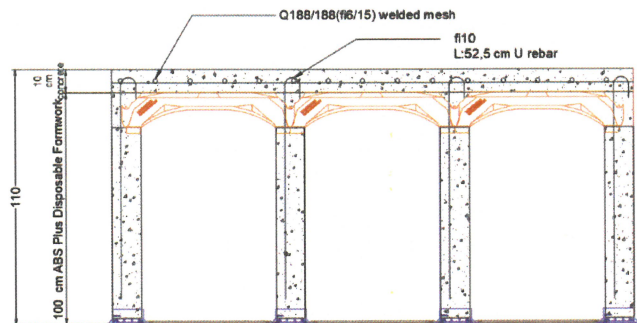
The disposable formwork systems have different heights and different concrete thicknesses. Tests were applied on 4 samples with various heights. For this testing, a close loop steel frame structure was fixed onto a flat concrete floor. The loads were applied by a hydraulic jack that was mounted to the frame. The load was applied on a point which is located on the upper surface of the system and loading axis was between two pipe columns. Load was applied on a $\Phi 25$ cm diameter circular area to symbolize a vehicle wheel. Photographs of the test set-up can be seen below. During the tests, loads were applied with a hydraulic jack which has 0.1 bar precision manometer. At the same time, displacements of the system were recorded by a $1\mu\text{m}$ precision digital extensometer with respect to loads.

- i) The specimen had 10 cm concrete thickness reinforced with a welded mesh and has pipe columns which are reinforced with $\Phi 10$ U shaped ribbed steel. Schematic drawings of H100 type and test results of 100 cm raised disposable formwork system are shown below.



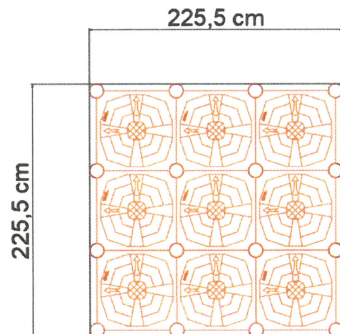
ABS Plus Disposable Formwork 100 cm + 10 cm concrete
(2.5 cm base + 82.5 cm tube + 15 cm dome)

H100 + 10 + U rebar
0,84 m³ concrete = 2,12 ton



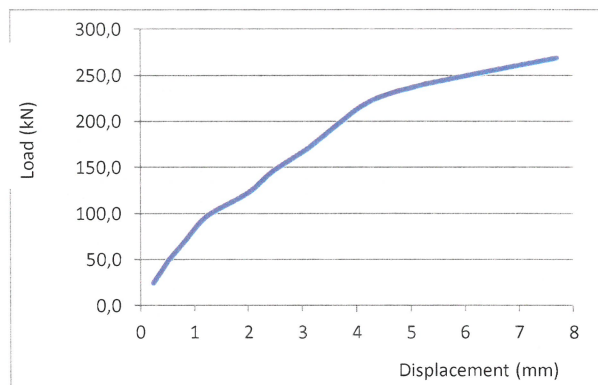
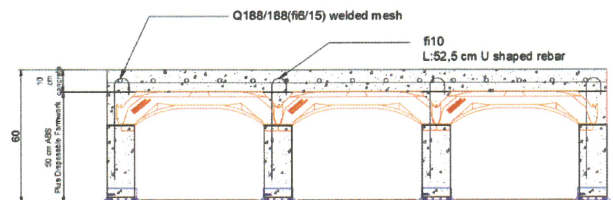
The specimen had 10 cm concrete thickness reinforced with a welded mesh and had pipe columns which were reinforced with $\Phi 10$ U shaped ribbed steel. Maximum load capacity of 100 cm raised disposable formwork system in circular area of $\Phi 25$ cm diameter was determined as 278.6 kN.

- ii) The specimen had 10 cm concrete thickness reinforced with a welded mesh and has pipe columns which are reinforced with $\Phi 10$ U shaped ribbed steel. Test results of 50 cm raised disposable formwork system are shown below.



ABS Plus Disposable Formwork 50 cm + 10 cm concrete
(2.5 cm base + 32.5 cm tube + 15 cm dome)

H50 +10 + U shaped rebar
0,75 m3 concrete = 1,86 ton

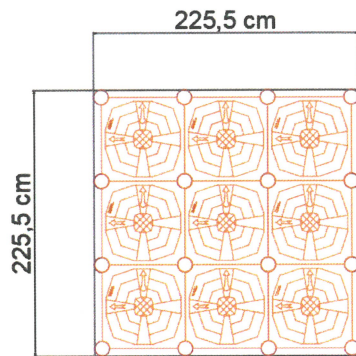


The specimen had 10 cm concrete cover reinforced with a welded mesh and has pipe columns which are reinforced with $\Phi 10$ U shaped ribbed steel. Maximum load capacity of 50 cm raised disposable formwork system in circular area of $\Phi 25$ cm diameter was determined as 283.2 kN.

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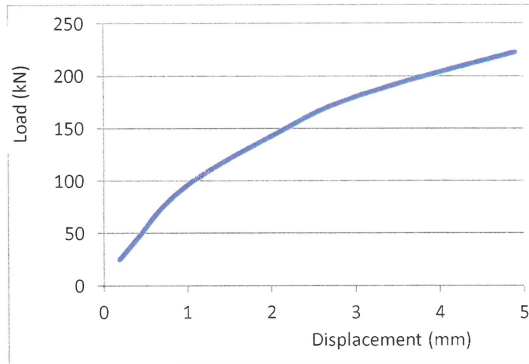
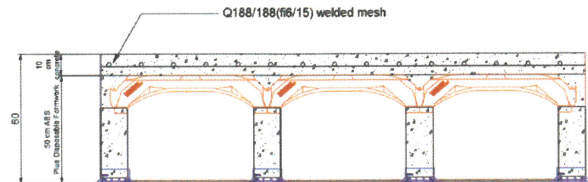
- iii) The specimen had 10 cm concrete cover reinforced with a welded mesh but the pipe columns are plain (without reinforcement). Test results of 50 cm raised disposable formwork system are shown below.



ABS Plus Disposable Formwork 50 cm + 10 cm concrete
(2.5 cm base + 32.5 cm tube + 15 cm dome)

H50 +10 - no U rebar

0,75 m3 concrete = 1,86 ton

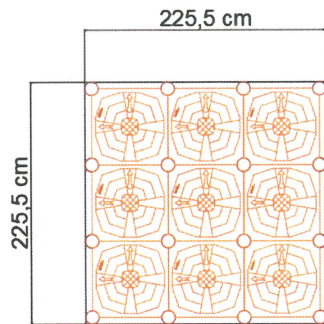


The specimen had 10 cm concrete cover reinforced with a welded mesh but the pipe columns are plain (without reinforcement). Maximum load capacity of 50 cm raised disposable formwork system in circular area of $\Phi 25$ cm diameter was determined as 238.5 kN.

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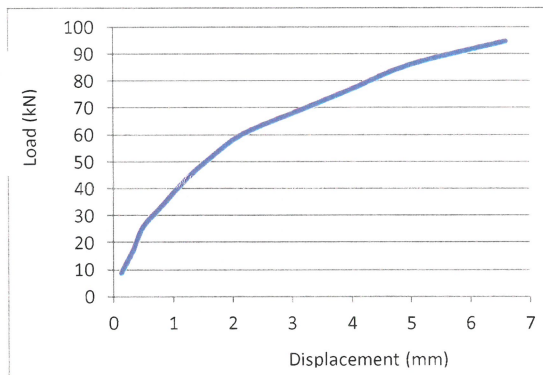
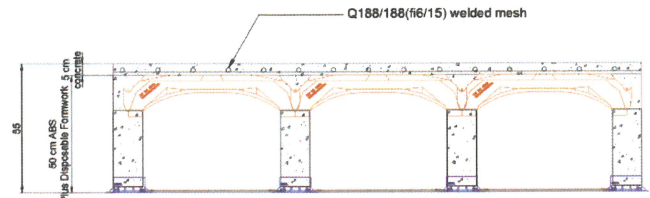
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- iv) The specimen had 5 cm concrete cover reinforced with a welded mesh but the pipe columns are plain (without reinforcement). Test results of 50 cm raised disposable formwork system are shown below.



ABS Plus Disposable Formwork 50 cm + 5 cm concrete
(2.5 cm base + 32.5 cm tube + 15 cm dome)

H50 + 5 - no U shaped rebar
0.49 m³ concrete = 1.23 ton



The specimen had 5 cm concrete cover reinforced with a welded mesh but the pipe columns are plain (without reinforcement). Maximum load capacity of 50 cm raised disposable formwork system in circular area of $\Phi 25$ cm diameter was determined as 125.9 kN.


Signature

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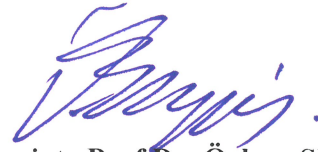
Table 2. Loading Test Results

Sample	ABS Plus Disposable Formwork height (cm)	Thiichness of concrete cover (cm)	Reinforcement status of pipe columns	Total height (cm)	Maximum load (kN)
H100	100	10	Yes ($\Phi 10$)	110	278,6
H50	50	10	Yes ($\Phi 10$)	60	283,2
H50	50	10	None	60	238,5
H50	50	5	None	55	125,9

**It was declared that compressive strength of concrete used in all samples is C30 class.*



Koray M. ARSLAN
Civil Engineer, Msc.



Associate Prof Dr. Özkan ŞENGÜL

ITU Faculty of Civil Engineering
Construction Materials Division

