[TD-DMU.21.0050]
[Rev. 00]

Test Procedure of Interior Panel

[124 DMU Project]

[Issued Date .....: 26/12/2014]

[Revision Date .....: 00/00/20..]

	Name	Signature
Approved by	Tacettin TURAN	
Checked by	Alper ÇİNÇİK	
Created by	Adem TOKGÖZ	

Form No: TAGF-10	Issued Date: 9/16/2013	Rev. No: 0	Form Name: TECHNICAL DOCUMENT

Revision History

Rev. No	Revision Info	Date

Copyright © TÜVASAŞ. All rights reserved, including industrial property rights applications.
TÜVASAŞ retains any power of disposal, such as copying and transferring.

CONTENTS

1. Introduction 4
2. Type Tests and Acceptable Criteria..... 4
3. Standard and Reference..... 4
3.1. Standard 4
3.2. Reference..... 4
4. Inspection and Test 5
4.1. Visual Inspection..... 5
4.2. Dimensional Inspection..... 5
4.3. Mechanical Properties... 5
4.4. Fire Performance..... 6
4.5. Inspection Item..... 6
5. Report..... 8
6. Inspection & Test sheet..... 9

Copyright © TÜVASAŞ. All rights reserved, including industrial property rights applications.
TÜVASAŞ retains any power of disposal, such as copying and transferring.

1. Introduction

This document describes the test procedure of interior panel for Tuvasas DMU.

2. Type Tests and Acceptable Criteria

Test No.	Test Description	Acceptance Criteria
Test 1: Visual Inspection	Visual Inspection - Standard : ASTM D2563	- There is no scratches and cracks on the panel surfaces. - There is no major chips, pin holes and discolor on the panel surfaces.
Test 2: Dimensional Inspection	All dimensions of drawings shall be checked.	-. Thickness : 2.5+0.5mm -. Length / Width >2.00m : ±2.5 >1.00m : ±2.0 >0.50m : ±1.5 >0.25m : ±1.0 <0.25m : ±0.5
Test 3: Mechanical Properties		
Strength	Tensile Strength	ASTM D638, Open Molding : ≥ 70 MN/m² Matched Die Molding : ≥ 85 MN/m²
	Flexural Strength	ASTM D790, Open Molding ≥ 105 MN/m² Matched Die Molding : ≥ 155 MN/m²
	Compression Strength	ASTM D695, Open Molding ≥ 125 MN/m² Matched Die Molding : ≥ 155 MN/m²
	Impact Strength (per 25mm of notch)	ASTM D256, Open Molding ≥ 8Nm Matched Die Molding ≥ 11Nm
Hardness	Hardness	≥ 45 Barcol
Stiffness	Uniform load	deflect : less than 1 percent of its short span length
	Centrally applied load	deflect : less than 1 percent of its short span length
	Impact energy	withstanding without permanent deformation or racking
Test 4: Fire Performance	EN 45545-2:2013 OR	R1-HL2
	DIN 5510-2:2009	S3-SR2-ST2-FED≤1(30 minute)

3. Standard and Reference

3.1. Standard

ASTM D2563 : Classifying Visual Defects in Fiber Glass-Reinforced Plastic

ASTM D638 : Standard Test Method for Tensile Properties of Plastics

ASTM D790 : Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

Copyright © TÜVASAŞ. All rights reserved, including industrial property rights applications.
TÜVASAŞ retains any power of disposal, such as copying and transferring.

ASTM D695: Standard Test Methods for Compressive Properties of Rigid Plastics

ASTM D256: Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics

DIN 5510-2:2009: Preventive fire protection in railway vehicle-Part 2: Fire behavior and fire side effects of materials and parts-Classification, requirements and test methods

EN 45545-2:2013: Railway applications- Fire protection on railway vehicles-Parts 2: Requirements for fire behavior of materials and components

3.2. Reference

Drawing: Relevant Drawings

Document: TD-DMU.21.0048, Product Description of Interior Panel (124 DMU)

4. Inspection and Test

4.1.Visual Inspection

1) Criteria

There is no scratches and cracks on the panel surfaces.
There is no major chips, pin holes and discolor on the panel surfaces.

2) Standard

ASTM D 2563

4.2. Dimensional Inspection

1) Criteria:

- Thickness : 2.5 +0.5 / 0mm
- Length / Width
  >2.00m : ±2.5
  >1.00m : ±2.0
  >0.50m : ±1.5
  >0.25m : ±1.0
  <0.25m : ±0.5

4.3. Mechanical Properties

4.3.1 Strength

1) Tensile Strength
   - Criteria : Open Molding : ≥ 70 MN/m², Matched Die Molding : ≥ 85 MN/m²
   - Standard : ASTM D638
2) Flexural Strength
   - Criteria : Open Molding ≥ 105 MN/m², Matched Die Molding : ≥ 155 MN/m²
   - Standard : ASTM D790
3) Compression Strength
   - Criteria : Open Molding ≥ 125 MN/m², Matched Die Molding : ≥ 155 MN/m²
   - Standard : ASTM D695

Copyright © TÜVASAŞ. All rights reserved, including industrial property rights applications.
TÜVASAŞ retains any power of disposal, such as copying and transferring.

4) Impact Strength
- Criteria : Open Molding ≥ 8Nm , Matched Die Molding ≥ 11Nm
- Standard : ASTM D256

4.3.2 Hardness
1) Criteria
≥ 45 Barcol

4.3.3 Stiffness
1) Uniform load
- Test area : 320mm×320mm
- Load : 13.6kg
- Load area : 304.8mm×304.8mm
- Criteria = deflect : less than 1 percent of its short span length

2) Centrally applied load
- Test area : 254mm×254mm
- Load : 22.7kg
- Load area : 50.8mm×50.8mm
- Criteria = deflect : less than 1 percent of its short span length

3) Impact energy
- Test area : 254mm×254mm
- Load : 5.5kg
- Drop height : 500mm
- Load area : 50.8mm×25.4mm
- Criteria = withstanding without permanent deformation or racking

4.4. Fire Performance

EN 45545-2:2013 / R1-HL2

or

DIN 5510-2:2009 / S3-SR2-ST2-FED≤1(30 minute)

Copyright © TÜVASAŞ. All rights reserved, including industrial property rights applications.
TÜVASAŞ retains any power of disposal, such as copying and transferring.

4.5. Inspection Item

ITEMS	TYPE TEST	ROUTINE TEST
Visual Inspection	o	o
Dimensional Inspection	o	o
Tensile Strength	o	
Flexural Strength	o	
Compression Strength	o	
Impact Strength	o	
Hardness	o	
Uniform load	o	
Centrally applied load	o	
Impact energy	o	
Surface Flammability	o	
Density of Smoke	o	

5. Report

All of tests 4.1 to 4.4 shall be formally reported including photographic and / or measured records where applicable.

Certificate of the relevant fire testing conducted by independent accredited laboratories shall be included as appendices to the Type Test Report.

Copyright © TÜVASAŞ. All rights reserved, including industrial property rights applications.
TÜVASAŞ retains any power of disposal, such as copying and transferring.

6. Inspection & Test Sheet

PROJECT		Title Interior Panel (F.R.P)	Inspector	
			Signature	
			Date	

Test items	Check Point & Criteria	Result
Visual Inspection	- There is no scratches and cracks on the panel surfaces. - There is no major chips, pin holes and discolor on the panel surfaces. - Application Standard : ASTM D2563	Pass Fail
Dimensional Inspection	All dimensions of drawings shall be checked. -. Thickness : 2.5+0.5mm -. Length / Width >2.00m : ±2.5 >1.00m : ±2.0 >0.50m : ±1.5 >0.25m : ±1.0 <0.25m : ±0.5	Pass Fail
Tensile Strength	ASTM D638, Open Molding : ≥ 70 MN/m² Matched Die Molding : ≥ 85 MN/m²	Pass Fail
Flexural Strength	ASTM D790, Open Molding ≥ 105 MN/m² Matched Die Molding : ≥ 155 MN/m²	Pass Fail
Compression Strength	ASTM D695, Open Molding ≥ 125 MN/m² Matched Die Molding : ≥ 155 MN/m²	Pass Fail
Impact Strength (per 25mm of notch)	ASTM D256, Open Molding ≥ 8Nm Matched Die Molding ≥ 11Nm	Pass Fail
Hardness	≥ 45 Barcol	Pass Fail
Uniform load	deflect : less than 1 percent of its short span length	Pass Fail
Centrally applied load	deflect : less than 1 percent of its short span length	Pass Fail
Impact energy	withstanding without permanent deformation or racking	Pass Fail
Fire Performance	EN 45545-2:2013 / R1-HL2 ----------OR---------- DIN 5510-2:2009 / S3-SR2-ST2-FED≤1(30 minute)	Pass Fail Pass Fail

Copyright © TÜVASAŞ. All rights reserved, including industrial property rights applications.
TÜVASAŞ retains any power of disposal, such as copying and transferring.