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AB-0556-T

EFECTIS ERA AVRASYA TEST VE BELGELENDİRME A.Ş.

Dilovası OSB, 5. Kısım, Fırat Caddesi No:18, Dilovası, Kocaeli/TÜRKİYE

AB-0556-T
RFTR20276
01-26

DENEY RAPORU

TEST REPORT

Müşterinin adı/adresi *Customer name/address*	:	DOĞUŞ TEKNİK KLİMA HAVALANDIRMA SAN. VE TİC. LTD. ŞTİ. Oruçreis Mah. Vadi Cad. Giyimkent Sitesi B70 Blok No:76, Esenler, İstanbul / TURKIYE
İstek numarası *Order No.*	:	EEA-20-000091-REV2
Numunenin adı ve tarifi *Name and identity of test sample*	:	Fire Dampers "**DTY-08, DTY-09**"
Numunenin kabul tarihi *The date of receipt of sample*	:	26.08.2024
Açıklamalar	:	**This report has been issued as the English version of report no. RFTR20276, originally dated 19 January 2021.**
Deneyin yapıldığı tarih *Date of test*	:	27.08.2024
Raporun sayfa sayısı *Number of pages of the Report*	:	28 (44 pages including appendixes)

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The test and/or measurement results, the uncertainties (if applicable) with confidence probability and test methods are given on the following pages which are part of this report

Mühür *Seal*	**Tarih** *Date*	**Deney Sorumlusu** *Person in charge of test*	**Laboratuvar Müdürü** *Laboratory Manager*
	21.01.2026	*e-signed* Kaan ALTIPARMAK	*e-signed* Ali BAYRAKTAR

Phone: +902626581662 Fax: +902626581669 E-mail: turkiye@efectis.com Web: www.efectis.com

1. SCOPE

Fire resistance test, in conformity with the general requirements of standards EN 1363-1:2020, with substitute or additional methods of standard EN 1363-2:1999 and with particular requirements of standard EN 1366-2:2015**: Fire resistance tests for service installations – Part 2: Fire dampers.**

2. TEST LABORATORY

Name : Efectis Era Avrasya Test ve Belgelendirme A.Ş.

Address : Dilovası OSB, 5. Kısım, Fırat Caddesi No:18, Dilovası, Kocaeli/TURKIYE

3. DESCRIPTION OF THE TEST SPECIMEN

3.1. General

Product identification : Fire Dampers **"DTY-08, DTY-09"**

- Damper No.1 : "**DTY-08**" – Motor-operated fire damper
- Damper No.2 : "**DTY-09**" – Fusible-link operated fire damper

Mounting type : Mounted inside the vertical supporting construction.

Direction of fire :

Damper No.1 : Inside to outside (i→o)

Damper No.2 : Inside to outside (i→o)

Manufacturer : DOĞUŞ TEKNİK KLİMA HAVALANDIRMA SAN. VE TİC. LTD. ŞTİ.
Malkara OSB. 1. Yol No:1 Malkara, Tekirdağ/ TÜRKİYE

Sponsor : DOĞUŞ TEKNİK KLİMA HAVALANDIRMA SAN. VE TİC. LTD. ŞTİ.
Oruçreis Mah. Vadi Cad. Giyimkent Sitesi B70 Blok No:76, Esenler, İstanbul / TÜRKİYE

3.2. Construction

The fire dampers "**DTY-08**" and "**DTY-09**", with installation opening dimensions of 1147 × 647 mm (width × height), were installed in a wall-type supporting construction built from aerated concrete blocks.

The supporting construction was supplied by the test laboratory (Efectis Era Avrasya) and consisted of aerated concrete blocks with a nominal density of 650 kg/m³ and a thickness of 200 mm.

3.3. Components

3.3.1. *Damper No. 1*

3.3.1.1. Connecting Duct

- ***Material***: *Low carbon steel sheets*
- ***Dimensions***: *1000/1065 × 500/565 × 2000 × 1.5 mm (width × height × length × thickness)*
- ***Fixings***:
  - ***Type***: *Hex-head steel bolts connecting the connecting duct to the damper casing*
    - ***Dimensions***: *M8 × 40 mm (Ø × length)*
    - ***Location***: *Installed on the mating flanges, 7 bolts along the vertical edges and 13 bolts along the horizontal edges*

- ***Insulation***: *Ceramic fibre wool –* ***CCEWOOL Ceramic Fiber***
  - ***Manufacturer***: ***KİLTAŞ***
  - ***Density***: *96 kg/m³*
  - ***Thickness***: *50 mm*
  - ***Location***: *Applied to cover the entire surface of the duct; additionally installed between the wall penetration plates and the supporting construction on both sides*

- ***Sealant***:
  - ***Type***: *Water-based acrylic sealant –* ***CP 606***
    - ***Manufacturer***: ***HILTI***
  - ***Location***: *Applied between the mating flanges of the damper casing and the connecting duct, and along the inner edges of the duct*

- ***Duct cladding sheets***: *Galvanised steel sheets with a thickness of 0.6 mm*
  - ***Dimensions and quantities***:
    - *2000 × 1100 × 0.60 mm (height × width × thickness) – 2 pieces, top and bottom faces*
    - *200 × 600 × 0.60 mm (height × width × thickness) – 2 pieces, side faces*
    - *50 × 50 × 2000 × 0.60 mm (height × width × length × thickness) – 4 pieces, L-profiles at the corners*
  - ***Location***: *Installed over the ceramic fibre insulation so as to fully enclose the duct*

3.3.1.2. *Damper frame*

The damper casing was manufactured from two rectangular steel casing sections, which were fixed to each other using steel fasteners. The casing was installed within the supporting construction (wall) by means of brackets, leaving a clearance between the wall and the damper casing. All gaps between the damper casing and the supporting construction were filled with ceramic fibre insulation.
A heat-resistant sealant was applied along the inner edges of the damper casing, and intumescent seals were installed at the overlapping edges corresponding to the damper blade perimeter. The damper blade was manufactured from calcium silicate board.

- **Damper casing sheet**: Galvanised steel sheet with a thickness of 1.5 mm
  - **Dimensions**: 1000/1065 × 500/565 × 250 × 1.5 mm (width × height × depth × thickness)
- **Fixing**:
  - The casing sections were connected to each other using steel screws
    - **Dimensions**: M6 × 40 mm
    - **Location**: 4 screws vertically and 6 screws horizontally on the mating faces of the casings

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- **Damper blade**: Manufactured from calcium silicate board
  - **Mineral board**: Calcium silicate board – **CS Board**
    - **Manufacturer**: **Zibo Jucos Co.**
    - **Dimensions**: 994 × 494 × 30 mm (width × height × thickness)
    - **Nominal density**: 900 kg/m³

- **Seal**:
  - **Type**: Graphite-based halogen-free seal – **Kerafix Flexpan 200 NG-G**
    - **Manufacturer**: **KUHN**
    - **Dimensions**: **15 × 1.5 mm** (width × thickness)
    - **Location**: Installed along the inner perimeter of the damper casing at locations corresponding to the damper blade edges

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- **Sealant**:
  - **Type**: Water-based acrylic sealant – **CP 606**
    - **Manufacturer**: **HILTI**
    - **Location**: Applied along the inner edges of the damper casing
  - **Type**: Sodium silicate-based sealant – **CALOFER**
    - **Manufacturer**: **SOUDAL**
    - **Location**: Applied between the wall penetration plates and the supporting construction, and on the damper connection plates
- **Insulation**:
  - **Type**: Calcium silicate board – **CS Board**
    - **Manufacturer**: **Zibo Jucos Co.**
    - **Dimensions**:
      - 1045 × 160 × 30 mm (height × width × thickness) – external horizontal calcium silicate boards
      - 605 × 160 × 30 mm (height × width × thickness) – external vertical calcium silicate boards
      - 1000 × 40 × 30 mm (height × width × thickness) – internal horizontal calcium silicate boards
      - 565 × 40 × 30 mm (height × width × thickness) – internal vertical calcium silicate boards

    - **Location**:
      External horizontal and vertical calcium silicate boards were fixed symmetrically to the upper and side edges at the mid-point of the casing

joints using wall penetration plates.
Internal horizontal and vertical calcium silicate boards were fixed symmetrically to the upper and side edges at the mid-point of the casing joints using steel angle brackets.

- **Reinforcements**:
  - **Type**: Galvanised steel wall penetration plates, 1 mm thick
    - **Dimensions**:
      - 147 × 1068 × 1 mm (height × width × thickness) – horizontal penetration plate
      - 150 × 871 × 1 mm (height × width × thickness) – vertical penetration plate
    - **Fixing**: Each plate was fixed to the wall using 8 steel screws M7.5 × 80 mm (Ø × length) and to the duct using 4 steel screws M4
    - **Location**: Installed around the perimeter of the damper casing
  - **Type**: Galvanised steel external cladding plates, 1 mm thick
    - **Dimensions**:
      - 185 × 1000 × 1 mm (height × width × thickness) – horizontal cladding plate
      - 230 × 567 × 50 × 1 mm (height × width × depth × thickness) – vertical cladding plate
    - **Fixing**: Each plate was fixed to the damper using 4 × 10 mm steel screws
    - **Location**: Installed around the damper

- **Accessories**:
  - **Type**: Galvanised steel corner plates, 1.5 mm thick
    - **Dimensions**: 100 × 100 × 30 × 1.5 mm (height × width × depth × thickness)
    - **Fixing**: Welded to the damper
    - **Location**: Installed at the lower corners of the fire-exposed face of the damper and at the upper corners of the non-fire-exposed face
  - **Type**: Galvanised steel angle brackets, 1.5 mm thick
    - **Dimensions**:
      - 29 × 998 × 24 × 1.5 mm (height × width × depth × thickness) – horizontal angle
      - 19 × 230 × 24 × 1.5 mm (height × width × depth × thickness) – vertical angle
      - 19 × 24 × 100 × 1.5 mm (height × width × depth × thickness) – secondary vertical angle
    - **Fixing**:
      Horizontal angles were fixed to the damper using M4 × 10 mm steel rivets.
      Vertical angles were fixed to the damper using M4 × 10 mm steel rivets.
    - **Location**: See **Figure 4**

  - **Type**: Galvanised steel calcium silicate joint plates, 1 mm thick
    - **Dimensions**:
      - 60 × 160 × 60 × 1 mm (height × width × depth × thickness)
      - 20 × 70 × 28 × 1 mm (height × width × depth × thickness)

        - 20 × 35 × 28 × 1 mm (height × width × depth × thickness)
      - **Fixing**: Joint plates were fixed to the calcium silicate boards and the damper using M3 × 10 mm screws
      - **Location**: See **Figure 5**
    - **Type**: Galvanised steel access cover, 1.5 mm thick
      - **Diameter**: 76 mm
      - **Location**: Installed at the centre of the upper casing plate where the actuator is located
- **Operating mechanism**:
  The damper blade is operated by a spring-return actuator.

3.3.1.3. Actuator and Thermal Activation Unit

- **Actuator**: Spring-return type with thermo-electric activation unit – BF230-TN; Manufacturer: BELIMO
  - **Overall dimensions**: 248 × 98 × 58.6 mm (height × width × depth)
  - **Location**: Installed on the vertical edge of the damper on the non-fire-exposed side
- **Thermo-electric activation unit**: BAT72; Manufacturer: BELIMO
- **Motor shaft**: Square shaft
  - **Dimensions**: 12/14 × 12/14 × 1010/1070 mm (height × width × length)
  - **Location**: Installed within the damper casing and connected to the linkage arms
- **Linkage connection**:
  - **Type**: Low carbon steel linkage components
    - **Dimensions**:
      - 190 × 30 mm (height × width)
      - 120 × 30 mm (height × width)
    - **Location**: Installed between the motor shaft and the damper blade connection components
- **Damper blade connection**:
  - **Type**: Low carbon steel blade connection components
    - **Dimensions**:
      - 150 × 34 × 49 mm (height × width × depth)
      - 130 × 22 mm (height × width)
      - 150 × 48 × 30 mm (height × width × depth)
    - **Location**: Installed between the damper blade and the linkage connection
- **Motor protection box**: Manufactured from three calcium silicate boards
  - **Dimensions**:
    - 285 × 125 × 30 mm (height × width × thickness) – front
    - 70 × 105 × 30 mm (height × width × thickness) – top
    - 70 × 285 × 30 mm (height × width × thickness) – side
  - **Location**: Installed on the vertical edge of the damper on the non-fire-exposed side
  - **Fixing**: Fixed to the calcium silicate joint plate using two M4 × 25 screws; the joint plate was fixed to the damper
  - **Sealant**: Water-based acrylic sealant – CP 606; Manufacturer: HILTI

- **Location**: Applied between the motor protection box and the damper, and between the motor protection box and the duct cladding sheets

For further details, see **Figures 1 to 6.**

3.3.2. Damper No. 2

3.3.2.1. Connecting Duct

- **Material**: Low carbon steel sheets
- **Dimensions**: 1000/1065 × 500/565 × 2000 × 1.5 mm (width × height × length × thickness)
- **Fixings**:
  - **Type**: Hex-head steel bolts connecting the connecting duct to the damper casing
    - **Dimensions**: M8 × 40 mm (Ø × length)
    - **Location**: Installed on the mating flanges, 7 bolts along the vertical edges and 13 bolts along the horizontal edges
- **Insulation**: Ceramic fibre wool – CCEWOOL Ceramic Fiber; Manufacturer: KİLTAŞ
  - **Density**: 96 kg/m³
  - **Thickness**: 50 mm
  - **Location**: Applied to cover the entire surface of the duct; installed between the wall penetration plates and the supporting construction
- **Sealant**:
  - **Type**: Water-based acrylic sealant – CP 606; Manufacturer: HILTI
  - **Location**: Applied between the mating flanges of the damper casing and the connecting duct, and along the inner edges of the duct

- **Duct cladding sheets**: Galvanised steel sheets with a thickness of 0.60 mm
  - **Dimensions and quantities**:
    - 2000 × 1100 × 0.60 mm (height × width × thickness) – 2 pieces, top and bottom faces
    - 200 × 600 × 0.60 mm (height × width × thickness) – 2 pieces, side faces
    - 50 × 50 × 2000 × 0.60 mm (height × width × length × thickness) – 4 pieces, L-profiles at the corners
  - **Location**: Installed over the ceramic fibre insulation so as to fully enclose the duct

3.3.2.2 Damper Casing

The damper casing was manufactured from two rectangular steel casing sections, which were fixed to each other using bolts. The casing was installed within the supporting construction (wall) by means of brackets, leaving a clearance between the wall and the damper casing. All gaps between the damper casing and the supporting construction were filled with ceramic fibre insulation.
A heat-resistant sealant was applied along the inner edges of the damper casing, and intumescent seals were installed at the overlapping edges corresponding to the damper blade perimeter. The damper blade was manufactured from calcium silicate board.

- **Damper casing sheet**: Galvanised steel sheet with a thickness of 1.5 mm
  - **Dimensions**: 1000/1065 × 500/565 × 250 × 1.5 mm (width × height × depth × thickness)

- **Fixing**:
  - The casing sections were connected to each other using steel screws
    - **Dimensions**: M6 × 40 mm
    - **Location**: A total of 30 screws were used on the mating faces of the casings
- **Damper blade**: Manufactured from calcium silicate board
  - **Mineral board**: Calcium silicate board – CS Board; Manufacturer: Zibo Jucos Co.
    - **Dimensions**: 994 × 494 × 30 mm (width × height × thickness)
    - **Nominal density**: 900 kg/m³
- **Seal**:
  - **Type**: Graphite-based halogen-free seal – Kerafix Flexpan 200 NG-G; Manufacturer: KUHN
    - **Dimensions**: 15 × 1.5 mm (width × thickness)
    - **Location**: Installed along the inner perimeter of the damper casing at locations corresponding to the damper blade edges
- **Sealant**:
  - **Type**: Water-based acrylic sealant – CP 606; Manufacturer: HILTI
    - **Location**: Applied along the inner edges of the damper casing
  - **Type**: Sodium silicate-based sealant – CALOFER; Manufacturer: SOUDAL
    - **Location**: Applied between the wall penetration plates and the supporting construction, and on the damper connection plate
- **Insulation**:
  - **Type**: Calcium silicate board – CS Board; Manufacturer: Zibo Jucos Co.
    - **Dimensions**:
      - 1045 × 160 × 30 mm (height × width × thickness) – external horizontal calcium silicate boards
      - 605 × 160 × 30 mm (height × width × thickness) – external vertical calcium silicate boards
      - 1000 × 40 × 30 mm (height × width × thickness) – internal horizontal calcium silicate boards
      - 565 × 40 × 30 mm (height × width × thickness) – internal vertical calcium silicate boards
    - **Location**:
      External horizontal and vertical calcium silicate boards were fixed symmetrically to the upper and side edges at the mid-point of the casing joints using wall penetration plates.
      Internal horizontal and vertical calcium silicate boards were fixed symmetrically to the upper and side edges at the mid-point of the casing joints using steel angle brackets.

- **Reinforcements**:
  - **Type**: Galvanised steel wall penetration plates, 1 mm thick
    - **Dimensions**:
      - 147 × 1068 × 30 × 1 mm (height × width × depth × thickness) – horizontal penetration plate
      - 150 × 871 × 12 × 1 mm (height × width × depth × thickness) – vertical penetration plate

- **Fixing**: Each plate was fixed to the wall using 8 steel screws M7.5 × 80 mm (Ø × length) and to the duct using 4 steel screws M4
- **Location**: Installed around the perimeter of the damper casing

- **Type**: Galvanised steel external cladding plates, 1 mm thick
  - **Dimensions**:
    - 185 × 1000 × 1 mm (height × width × thickness) – horizontal cladding plate
    - 180 × 571 × 1 mm (height × width × thickness) – vertical cladding plate
  - **Fixing**: Each plate was fixed to the damper using M4 × 10 mm steel screws
  - **Location**: Installed around the damper

- **Accessories**:
  - **Type**: Galvanised steel corner plates, 1.5 mm thick
    - **Dimensions**: 100 × 100 × 30 × 1.5 mm (height × width × depth × thickness)
    - **Fixing**: Welded to the damper
    - **Location**: Installed at the lower corners of the fire-exposed face and at the upper corners of the non-fire-exposed face
  - **Type**: Low-carbon steel angle brackets, 1.5 mm thick
    - **Dimensions**:
      - 29 × 998 × 24 × 1.5 mm (height × width × depth × thickness) – horizontal angle
      - 19 × 230 × 24 × 1.5 mm (height × width × depth × thickness) – vertical angle
      - 19 × 24 × 100 × 1.5 mm (height × width × depth × thickness) – secondary vertical angle
    - **Fixing**: Fixed to the damper using M4 × 10 mm steel rivets
    - **Location**: See Figure 10
  - **Type**: Calcium silicate boards, 30 mm thick
    - **Location**: Installed around the damper blade; see Figure 11
  - **Type**: Galvanised steel calcium silicate joint plates, 1 mm thick
    - **Dimensions**:
      - 60 × 160 × 60 × 1 mm (height × width × depth × thickness)
      - 20 × 70 × 28 × 1 mm (height × width × depth × thickness)
      - 20 × 35 × 28 × 1 mm (height × width × depth × thickness)
    - **Fixing**: Fixed to the calcium silicate boards and the damper using M3 × 10 mm screws
    - **Location**: See Figure 11

  - **Type**: Galvanised steel stop plate, 1 mm thick
    - **Dimensions**: 40 × 60 × 1 mm (height × width × thickness)
    - **Fixing**: Fixed to the damper casing using M4 × 10 mm steel rivets
    - **Location**: Installed at the lower inner casing of the damper; see Figure 12

- **Operating mechanism**:
  The damper blade is operated by a spring-return fusible shaft.

3.3.2.3 Fusible Link

- **Fusible link**: Melting temperature 72 °C; Manufacturer: KAYI
  - **Dimensions**: 66.48 × 22.86 mm (height × width)
  - **Material**: Alloy-coated galvanised steel
  - **Location**: Installed on the vertical edge of the damper on the non-fire-exposed side
- **Fusible shaft**:
  - **Dimensions**: 5 × 100 × 22.5 mm (Ø × width × height)
- **Shaft**: Square shaft
  - **Dimensions**: 12/14 × 14 × 995/1120 mm (height × width × length)
  - **Location**: Installed within the damper casing and connected to the linkage arms; see Figure 12
- **Lever**:
  - **Width**: 121.16 mm; see Figure 12
  - **Location**: Fixed to the square shaft
- **Spring**: Low carbon steel spring; Manufacturer: YILMAZ ÇELİK YAY

For further details, see **Figures 7 to 12.**

4. PRE-TEST PROCESSES

4.1. Verification of specimen

Efectis Era Avrasya A.Ş. took no part in selection of the specimen and verified the materials and parts used during installation were attuned to data and drawings provided by the sponsor.

Brand, type, quantity and dimension information of the components, when it is not possible to be verified by the laboratory, are given according to the sponsor's declaration and the responsibility belongs to the sponsor. The test specimens are tested as received from the sponsor. (when the laboratory does not carry out sampling).

The installation was carried out by the sponsor.

The functionality tests of the dampers have been made before the fire resistance test by both laboratory and customer.

Damper was cycled 50 times in normal speed and no impairment in integrity or smoke leakage was observed.

4.2. Conditioning

The construction was stored in the laboratory of Efectis Era Avrasya A.Ş. under the following conditions.

Ambient temperature: (17,6 ± 2,9) °C

Relative humiditiy : (53 ± 10) %

4.3. Ambient leakage test

Prior to the fire resistance test, an ambient leakage test at 300 Pa was carried out.

The maximum ambient leakage measured in the test equipment and the connecting duct was as follows:

- **Damper A**: 18.20 m³/h
- **Damper B**: 51.35 m³/h

The maximum ambient leakage measured for the largest size damper was:

- **Damper A**: 107.89 m³/(hm²)
- **Damper B**: 161.24 m³/(hm²)

The maximum ambient leakage measured for the smallest size damper (200 × 200 mm) was 54.47 m³/(h·m²).

5. TEST PROCESS

5.1. Method

The fire test was conducted according to the European standard EN 1366-2:2015.

The heating of the furnace followed the standard fire curve, as specified in the European standard EN 1363-1:2020.

The target pressure in the furnace was 15 Pa at mid-height of the specimen.

5.2. Measurements

Following test data were measured during the test:

- Furnace internal atmosphere temperatures measured by six plate thermocouples (Furnace TC1 to Furnace TC6) uniformly distributed over the heated surface (see **Figure A1**).
- Furnace temperature deviation (error) graph (see **Figure A2**).
- Furnace pressures measured at floor level and at a height of 2.9 m above floor level (see **Figure A3**).
- Pressure difference between the furnace and the connecting duct (see **Figures A4 and A5**).
- Laboratory ambient temperature (see **Figure A6**).
- Surface temperatures of the unexposed sides of the test specimens measured by thermocouples TC16 to TC55 (see **Figures B2 to B7**).
- Ambient temperatures at the connecting duct outlet and at the measuring station (see **Figures B8 and B10**).
- Pressure difference measured at the measuring station (see **Figures B9 and B11**).
- Corrected volumetric flow rate values (see **Figures B12 and B13**).
- The locations of the thermocouples are shown in **Figure B1**.

6. OBSERVATIONS

Table 1: Observations during heating

Time (min.)	Fire resistance test
0	Heating was initiated (see Photos C1–C2).
0	Damper blades closed.
5	Leakage rate increased for Damper B. **Leakage rate ≥ 200 m³/(h·m²); smoke tightness (S) was lost.**
28	Smoke leakage observed for Damper B between the duct and the observation window.
31	Deformations observed in the duct on the observation window side for Damper B.
40	Leakage rate further increased for Damper B. **Leakage rate ≥ 360 m³/(h·m²); integrity (E) was lost.**
60	Damper A continued to maintain integrity, smoke tightness, and insulation performance.
90	Damper A continued to maintain integrity, smoke tightness, and insulation performance.
120	Damper A continued to maintain integrity, smoke tightness, and insulation performance.
180	Damper A continued to maintain integrity, smoke tightness, and insulation performance.
188	Deformations observed at the upper corners of the damper blade for Damper A.
240	Damper A continued to maintain integrity, smoke tightness, and insulation performance.
241	The test was terminated following consultation with the client **(see Photos C3–C4)**.

7. TEST RESULTS

7.1. Results

The results are given in Table 2 and appendix B.

During the heating, ambient temperature in the laboratory complied with the European standard EN 1363-1:2020.

7.2. Uncertainty of measurements

Due to the nature of fire resistance testing, in which several non-linear effects are present in both the test configuration and the test specimen, which influence each other, it is at this moment not yet possible to give a stated degree of uncertainty of measurement.

8. SUMMARY

The most important results of the examination are given in table 2.

Table 2: Summary of test results of the test specimen

	Damper No.1	Damper No.2
Integrity, **[E]**		
– Cotton pad	No failure (not applied).	No failure (not applied).
– Gap gauges ∅ 6 mm	No failure (not applied).	No failure (not applied).
∅ 25 mm	No failure (not applied).	No failure (not applied).
– Sustained flaming over 10 sec	No failure (not observed).	No failure (not observed).
– Leakage rate - 360 $m^3/(m^2.h)$	No failure.	40th minute
Insulation, **[I]**		
– Maximum temperature	No failure.	No failure.
– Average temperature	No failure.	No failure.
Smoke leakage, **[S]**		
– Leakage rate – 200 $m^3/(m^2.h)$	No failure.	5th minute
Test was terminated at 240th minute with sponsor approval.		

9. FIELD OF DIRECT APPLICATION OF TEST RESULTS

9.1. General

This report details the method of construction, the test conditions and the results obtained when the specific elements of construction described herein was tested following the procedure outlined in EN 1363-1:2020, and when appropriate EN 1363-2:1999. Any significant deviation with respect to size, constructional details, load stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

Changes that are not covered by following clauses are not allowed to be made.

9.2. Size of fire damper

The size of the fire damper may be reduced from the tested dimensions of 1000 × 500 mm (w × h), down to a minimum size of 200 × 200 mm (w × h). Increases in size beyond the tested dimensions are not permitted.

9.3. Fire dampers installed within structural openings

Fire dampers installed within a wall opening shall not be used in an orientation or position different from that of the supporting construction in which they were tested.

9.4. Separation between fire dampers and between fire dampers and construction elements

Fire dampers installed in separate ducts shall not be installed at a distance of less than 200 mm from each other, nor at a distance of less than 75 mm from any adjacent wall or floor.

9.5. Supporting constructions

The following supporting constructions are permitted to be used:

• Rigid supporting construction with a minimum density of 650 kg/m³ and a minimum thickness of 200 mm.

• Rigid supporting construction consisting of hollow blocks with a minimum fire resistance of 120 minutes, in which all voids in the blocks are filled/closed around the damper prior to the application of the final service penetration seal.

9.6. Blade pivot axis

Any change to the blade rotation axis and the actuator position is not permitted.

10. DRAWINGS

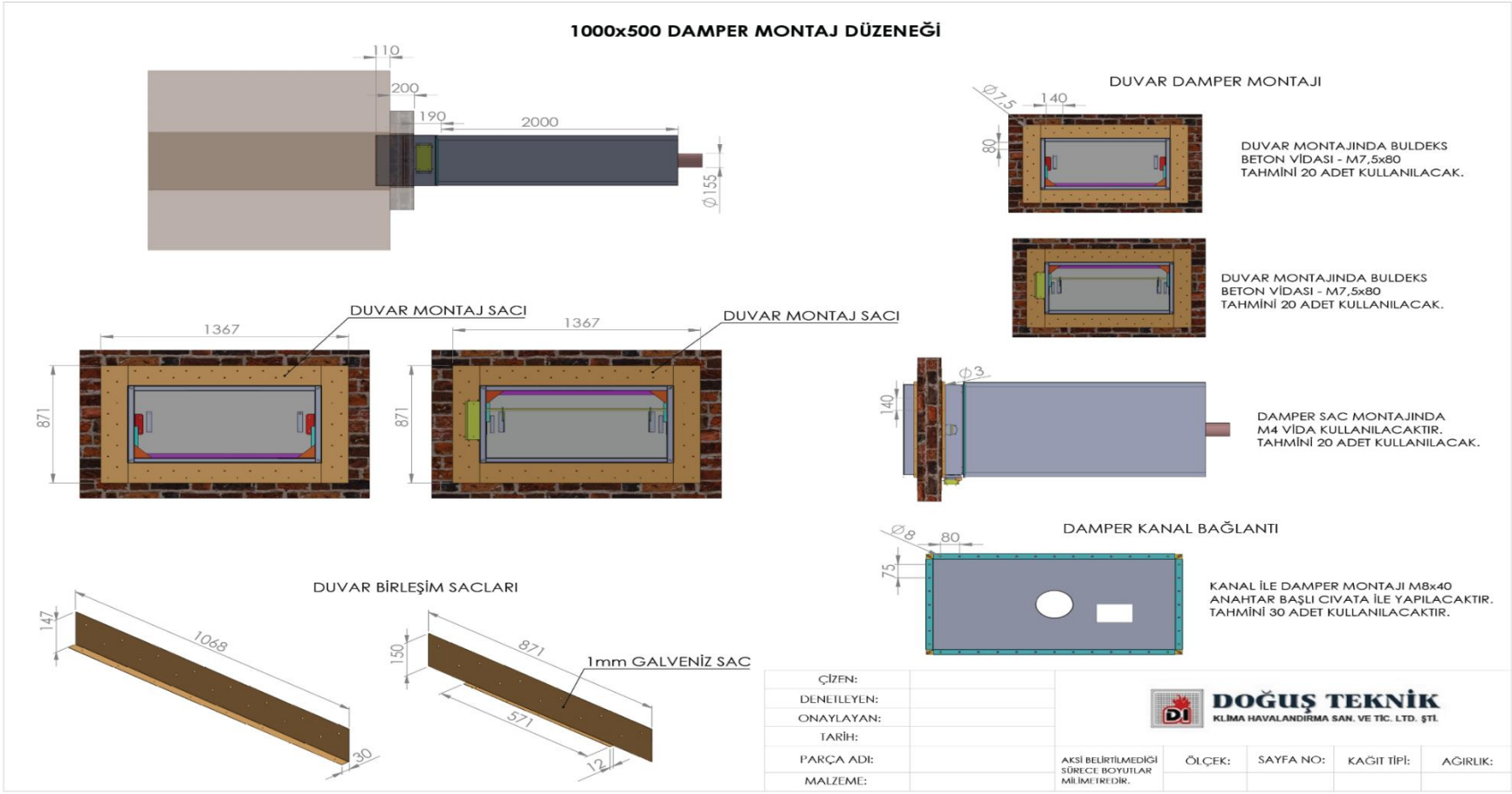

Figure 1: Installation arrangement of Damper A.

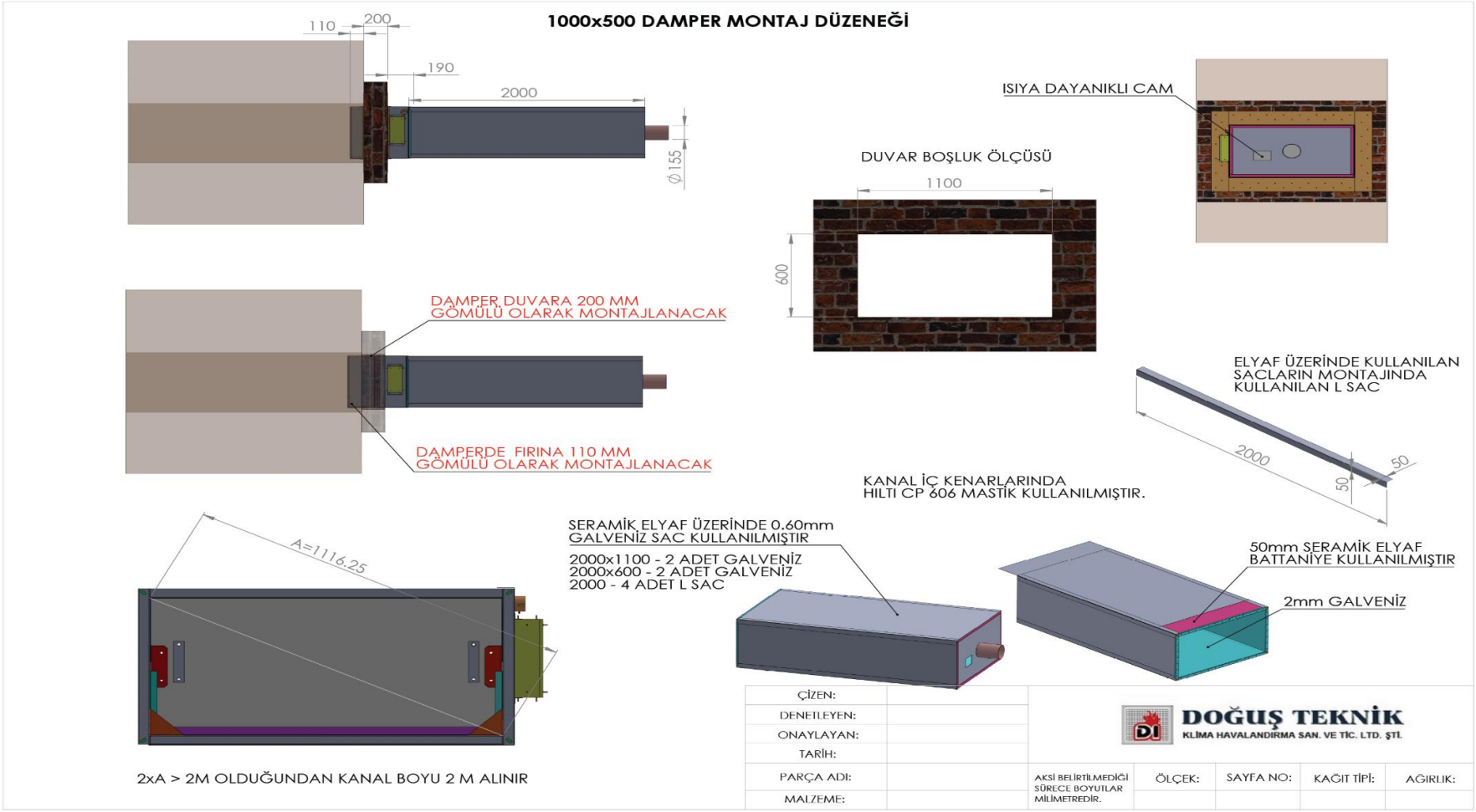

Figure 2: Installation arrangement of Damper A.

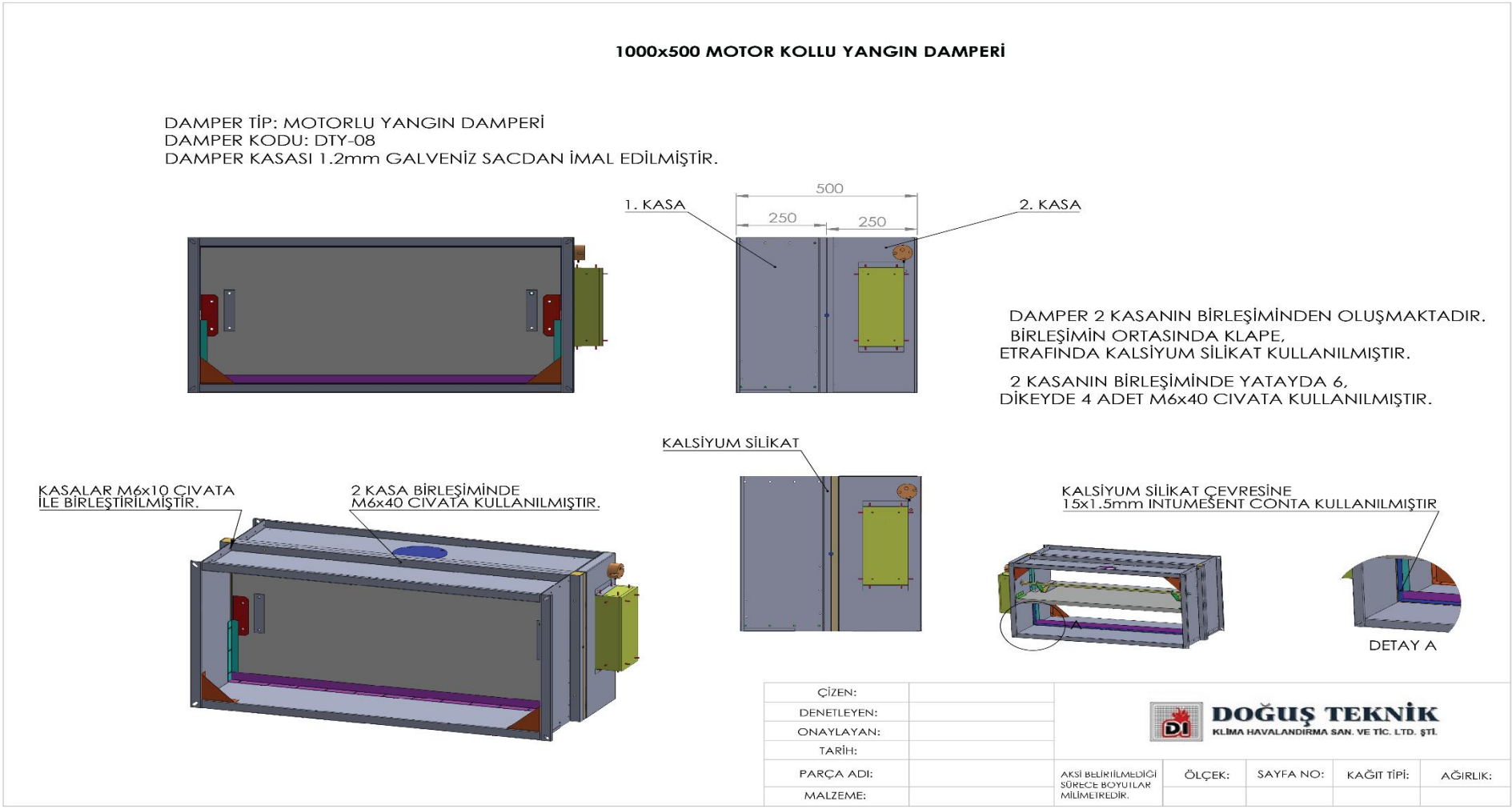

Figure 3: General view of Damper A.

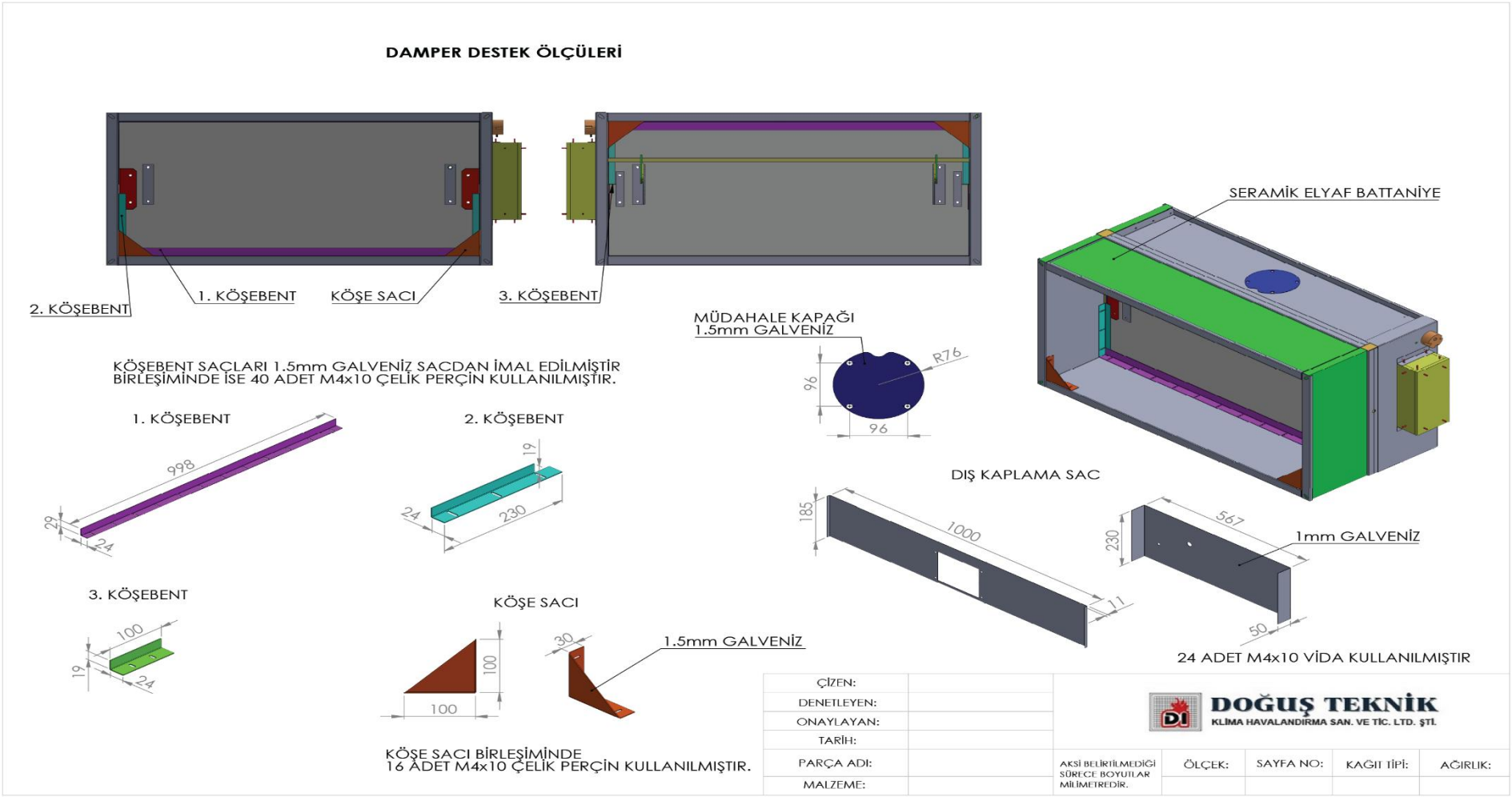

Figure 4: Accessories and cladding details of Damper A.

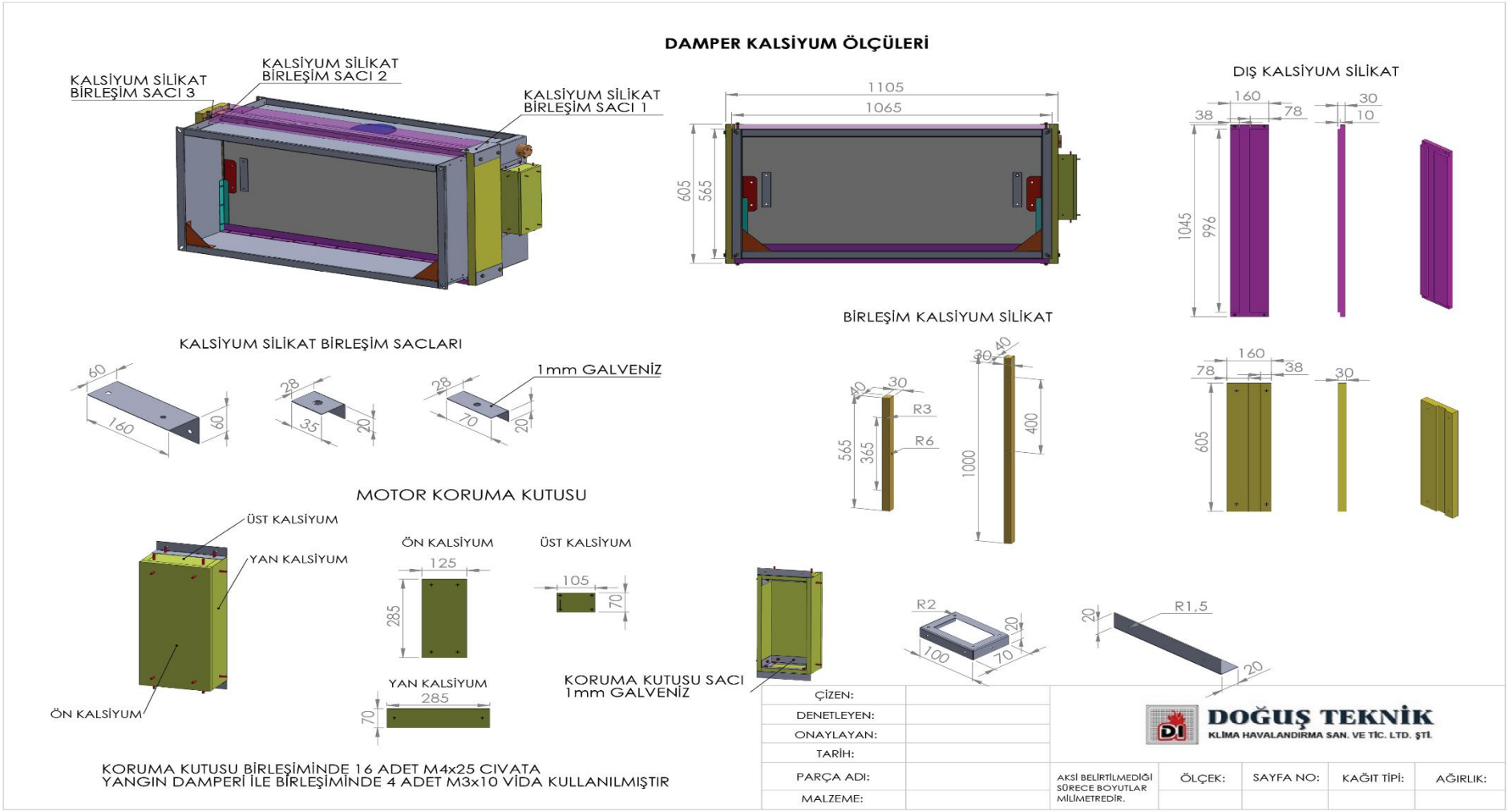

Figure 5: Overall dimensions and calcium silicate details of Damper A.

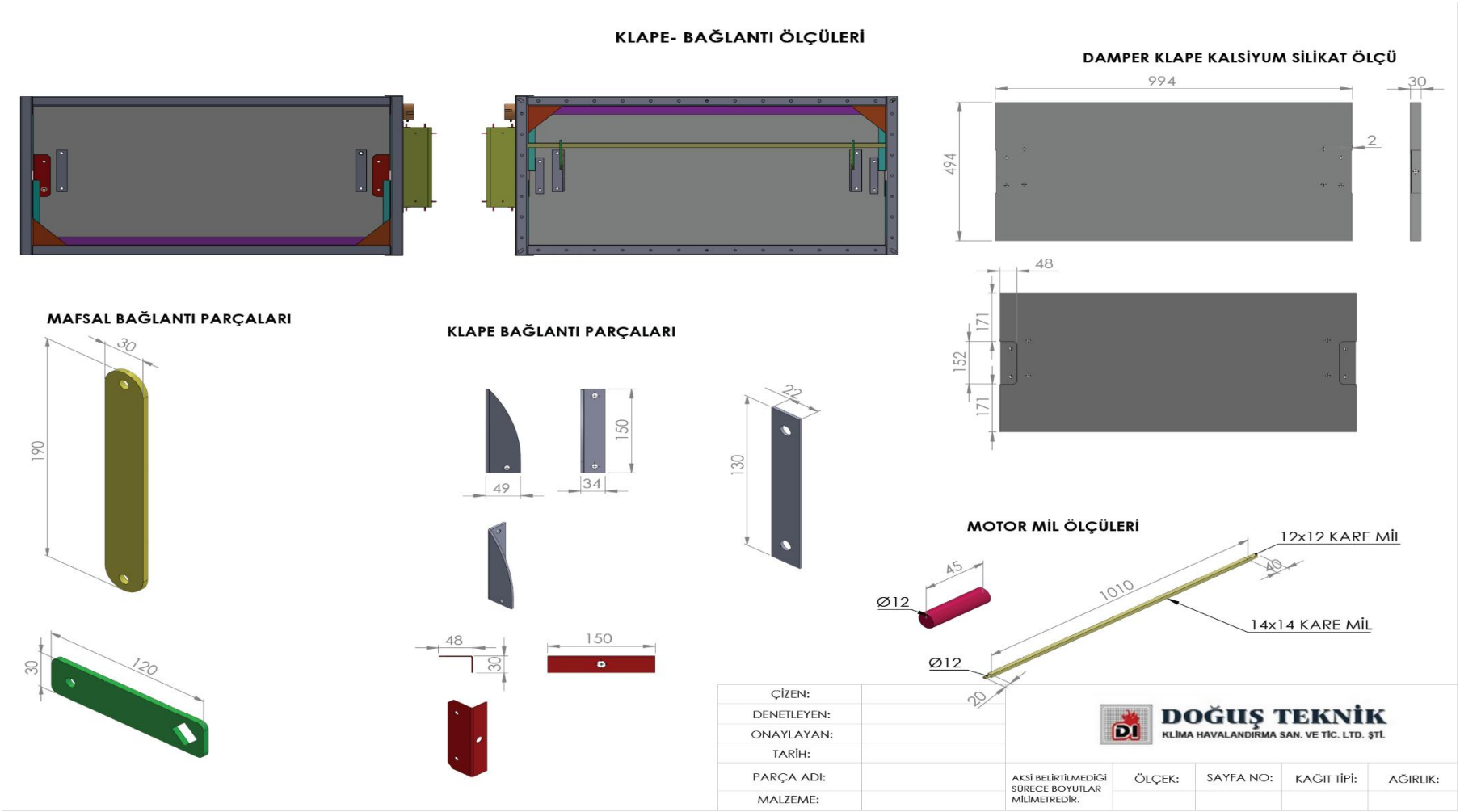

Figure 6: Overall dimensions and calcium silicate details of Damper A.

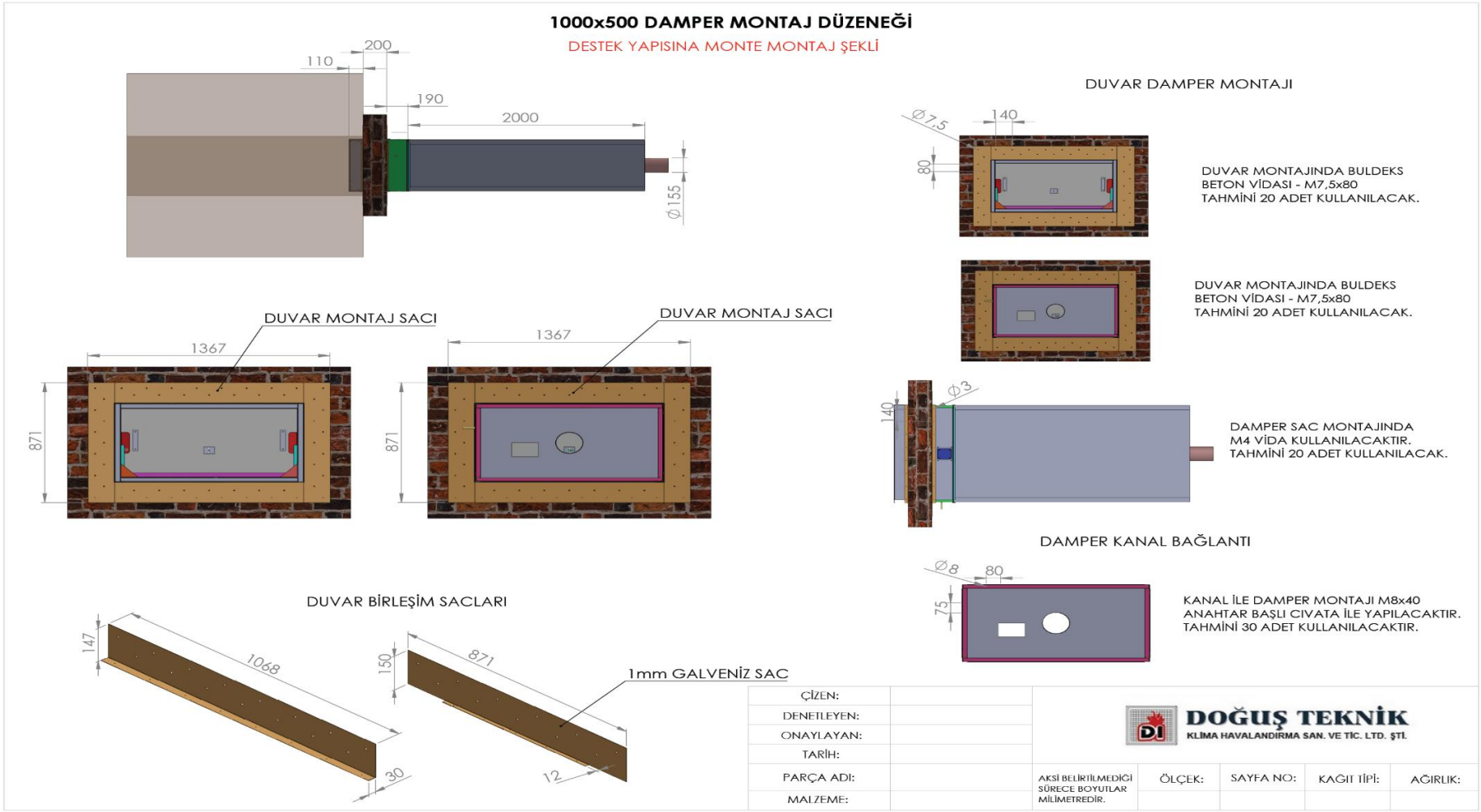

Figure 7: Installation arrangement of Damper B.

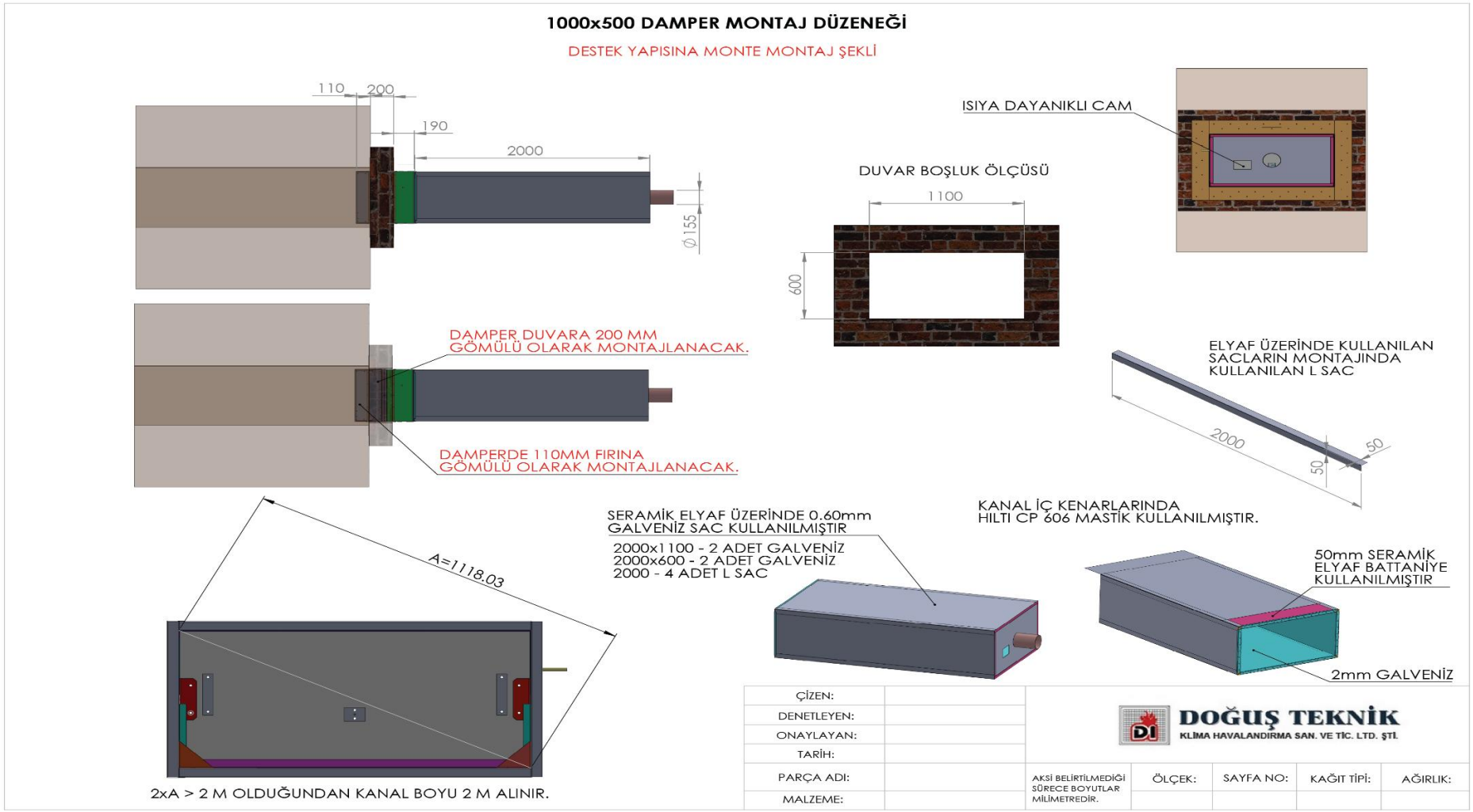

Figure 8: Installation arrangement of Damper B.

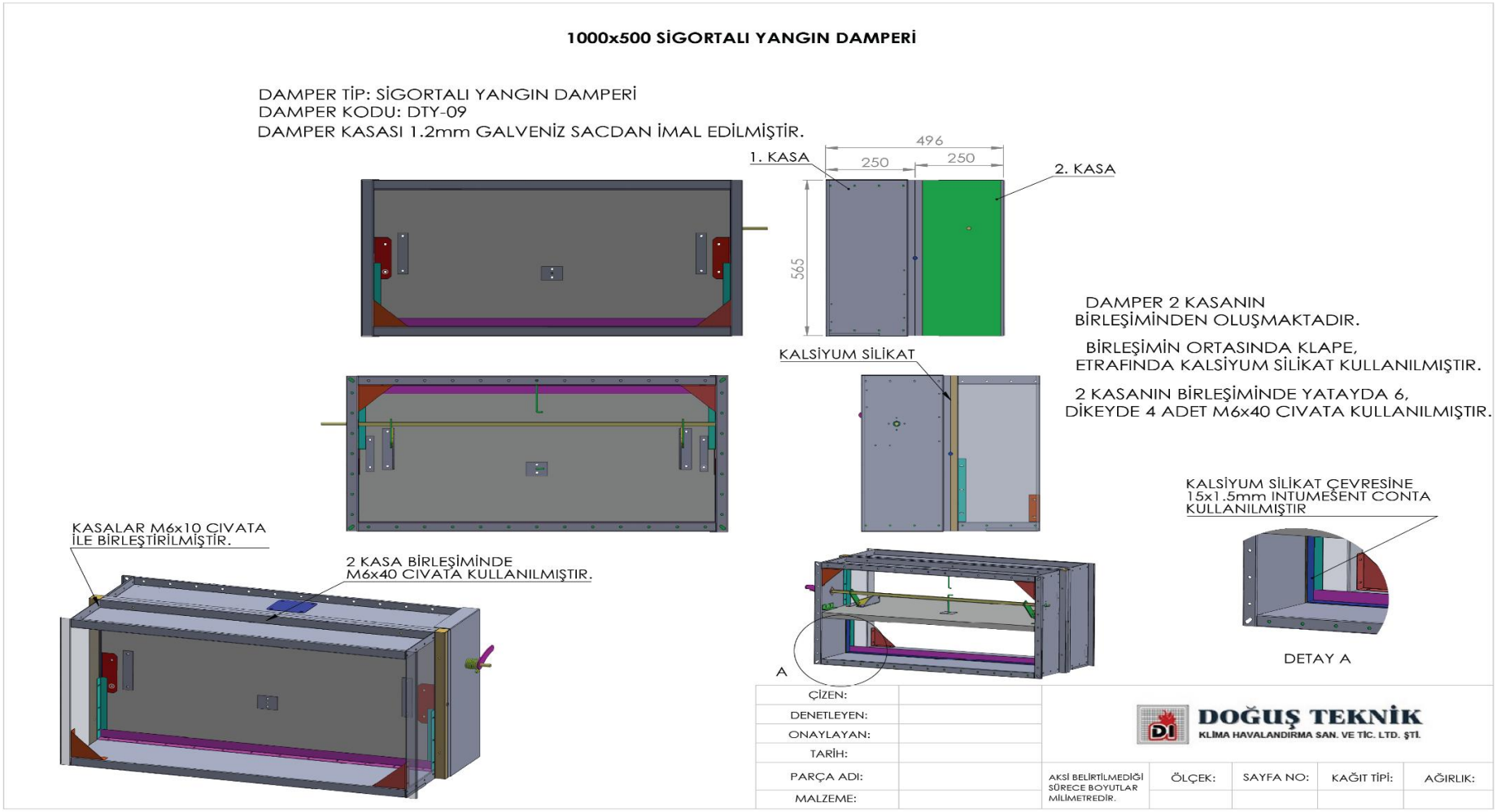

Figure 9: General view of Damper B.

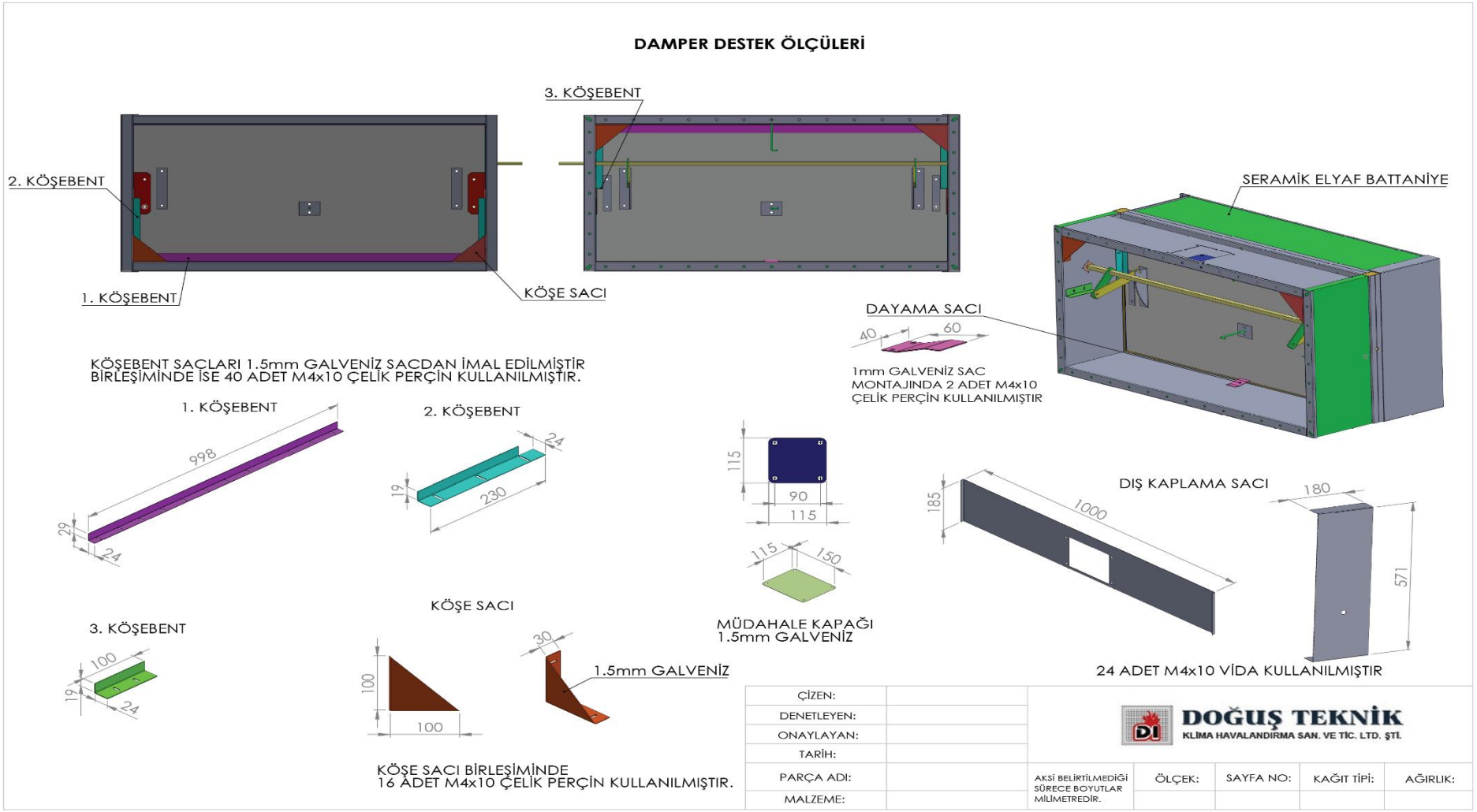

Figure 10: Accessories and cladding details of Damper B..

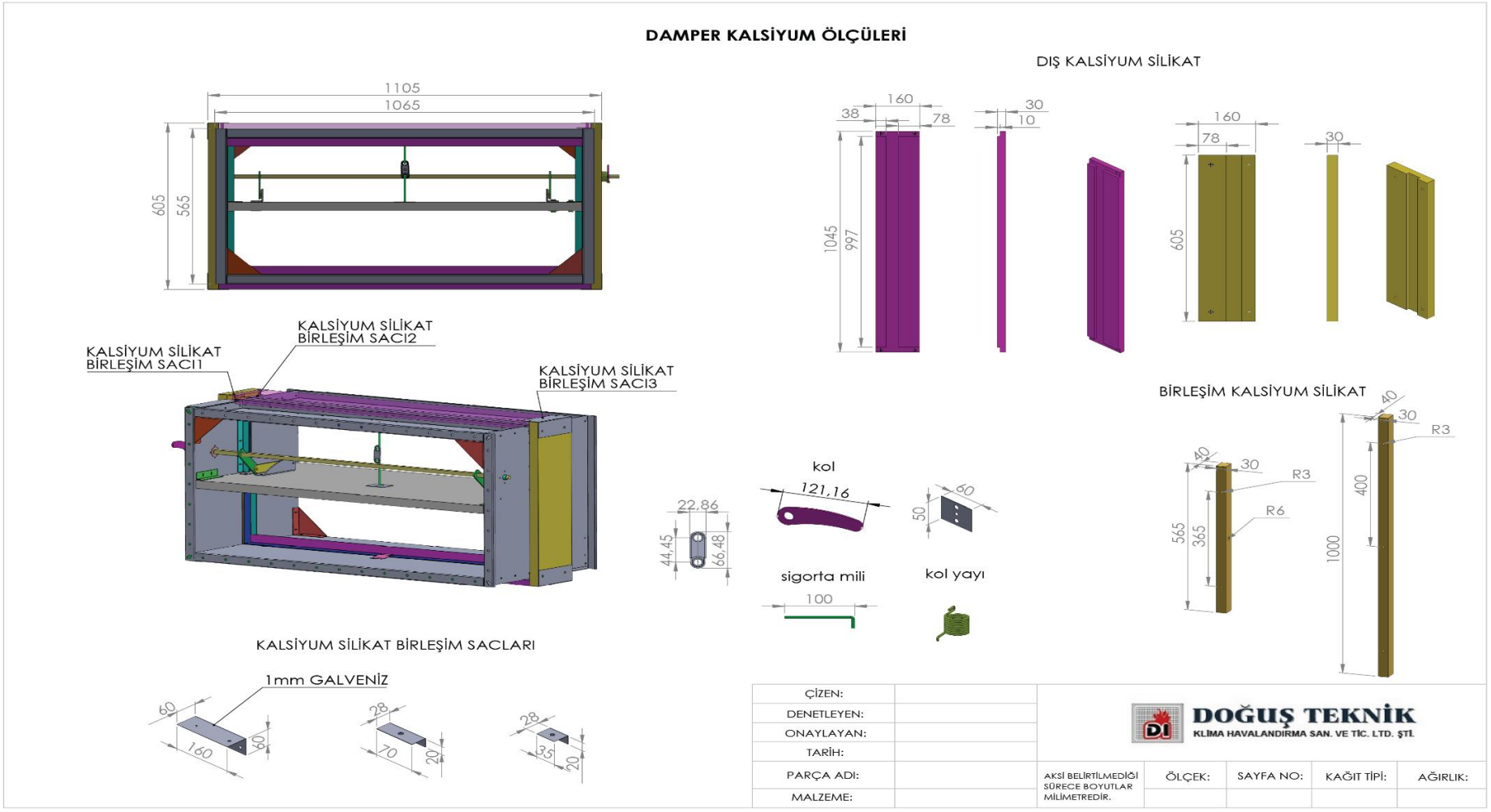

Figure 11: Overall dimensions and calcium silicate details of Damper B.

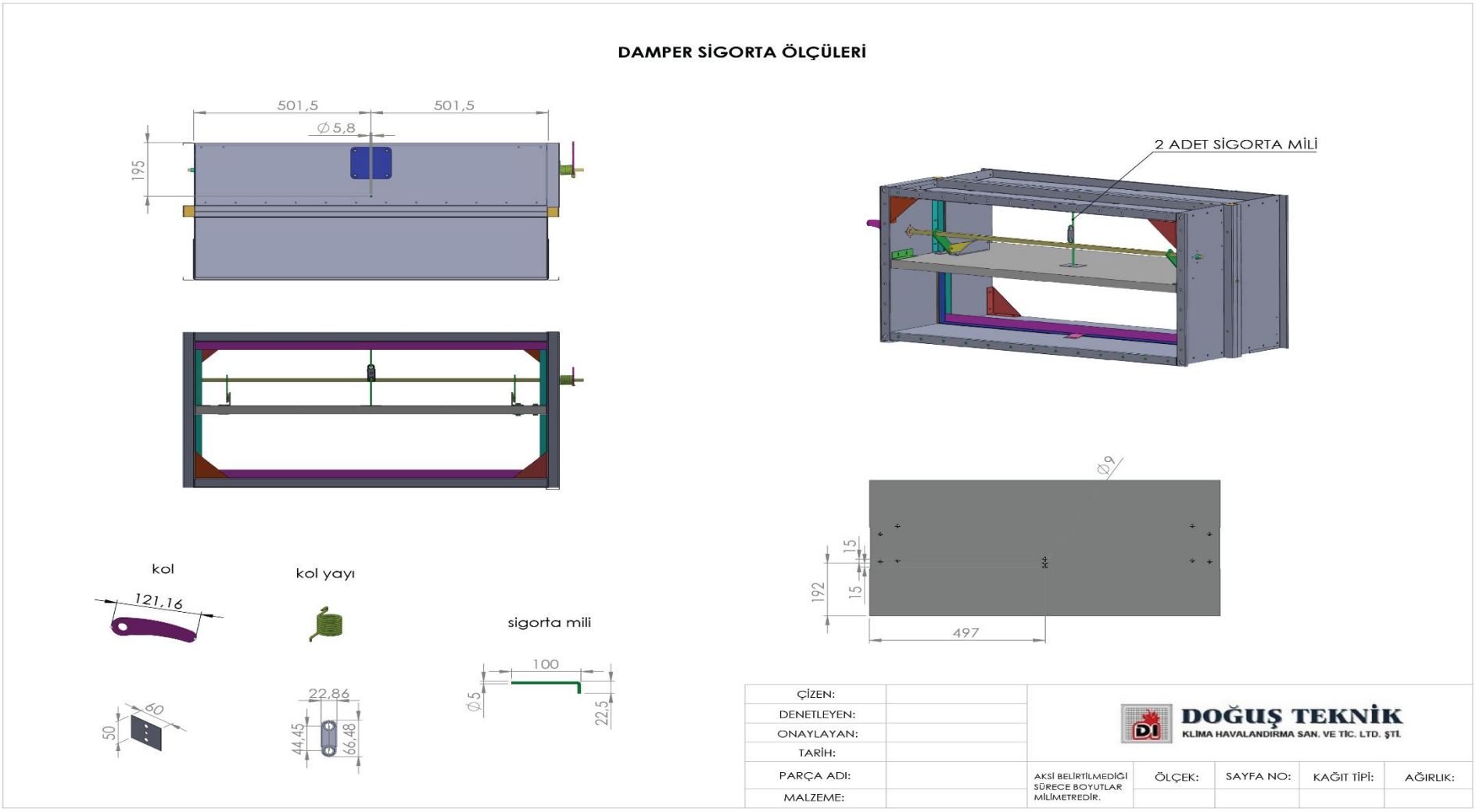

Figure 12: Fuse details of Damper B.

APPENDICES:

Appendix A: Furnace and laboratory conditions

Appendix B: Test result

Appendix C: Photos

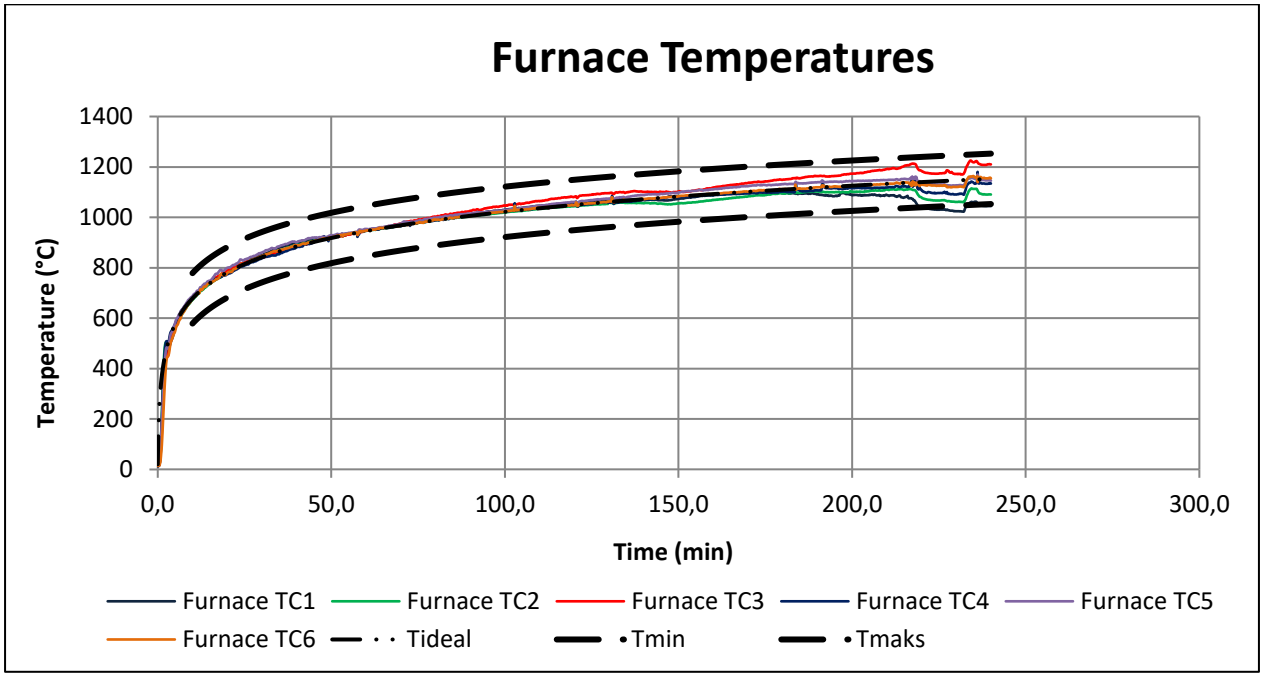

Figure A1: Furnace temperatures

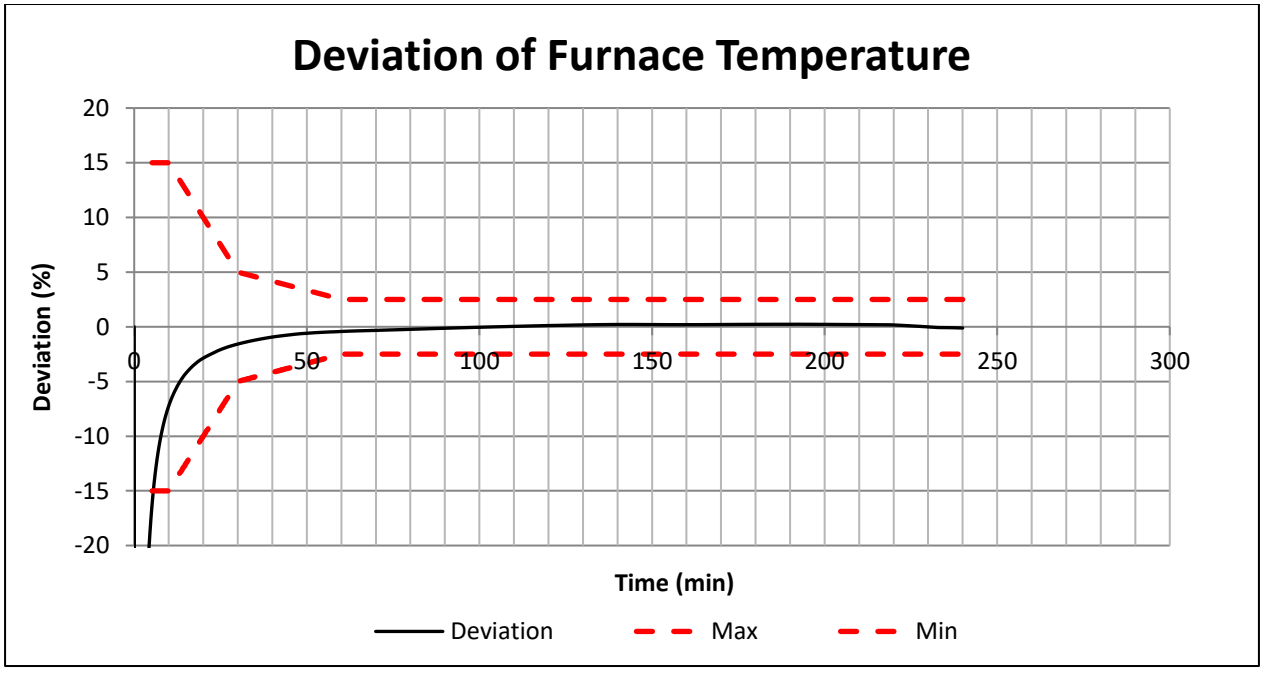

Figure A2: Deviation curve

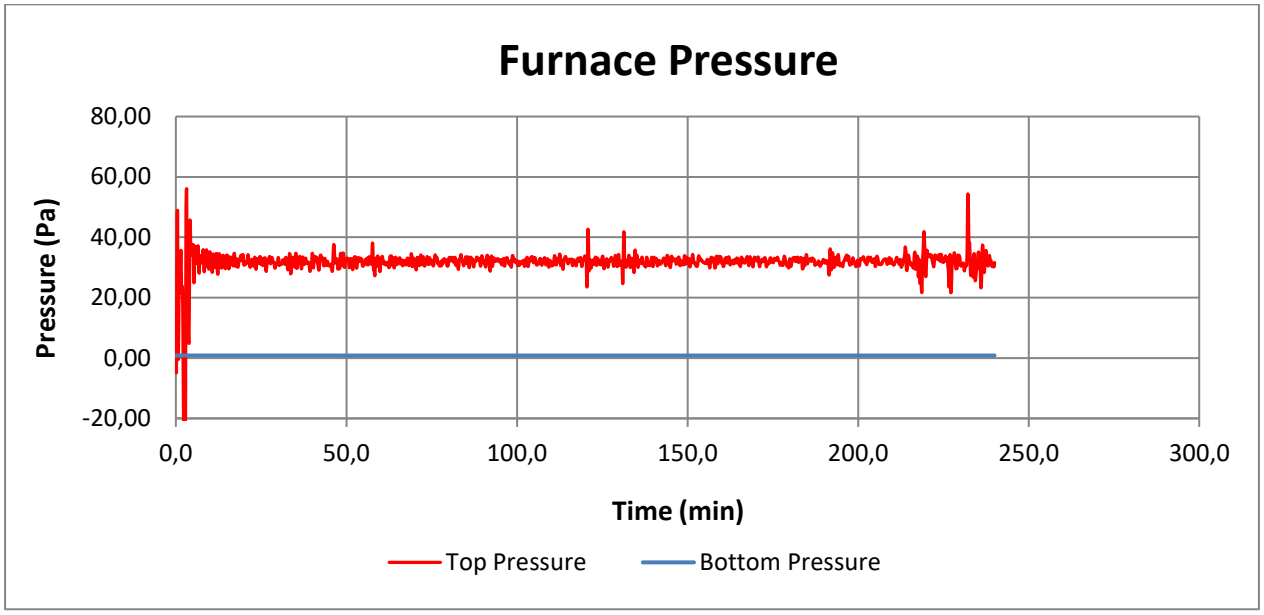

Figure A3: Pressure inside the furnace

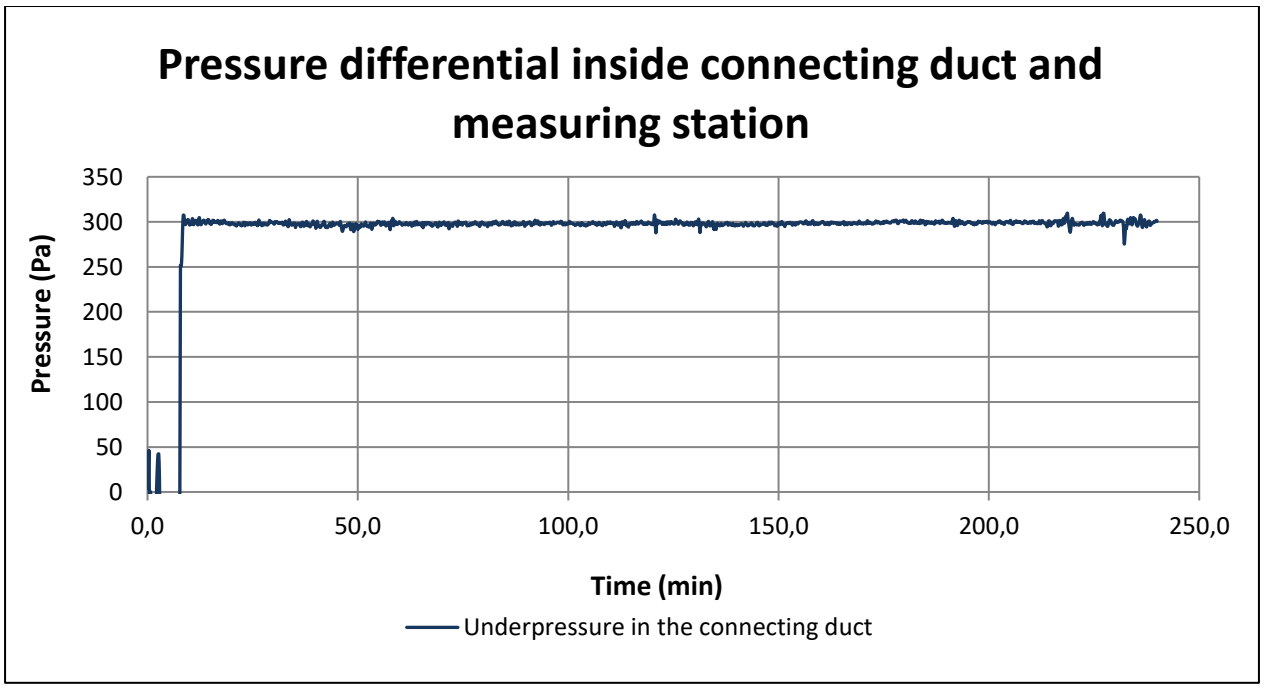

Figure A4: Pressure differential inside connecting duct and measuring station for Damper A

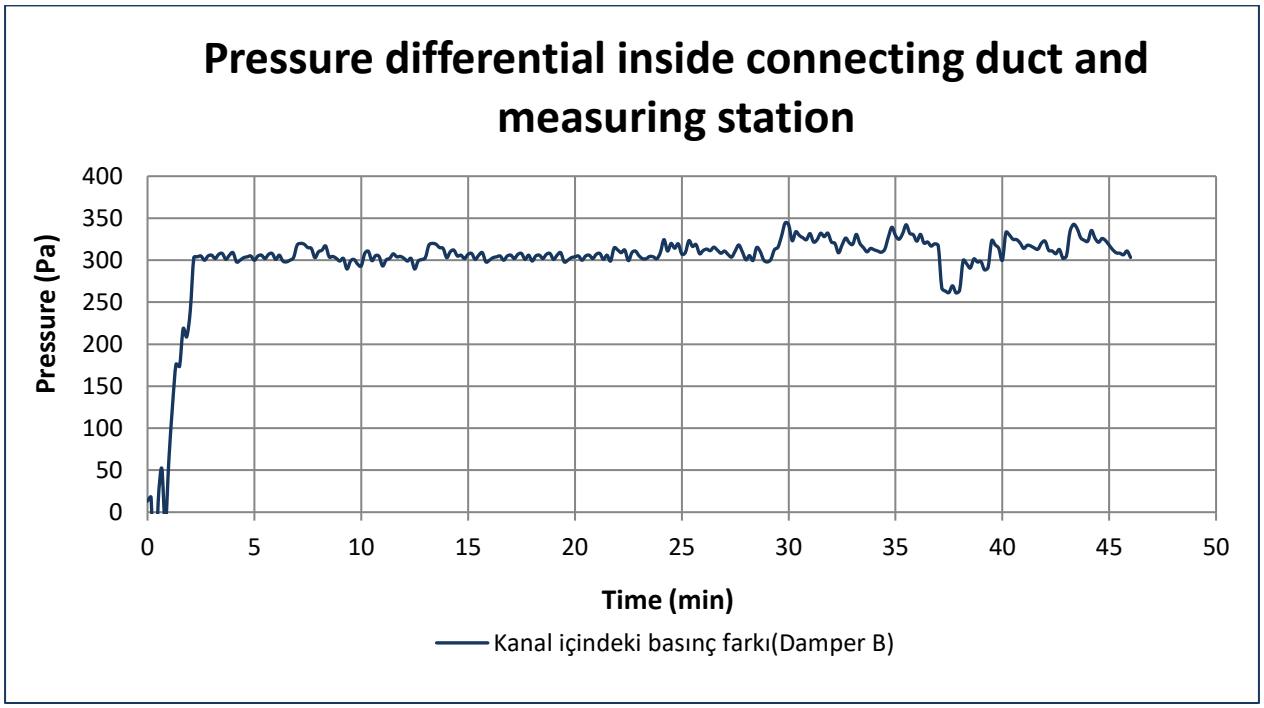

Figure A5: Pressure differential inside connecting duct and measuring station for Damper B

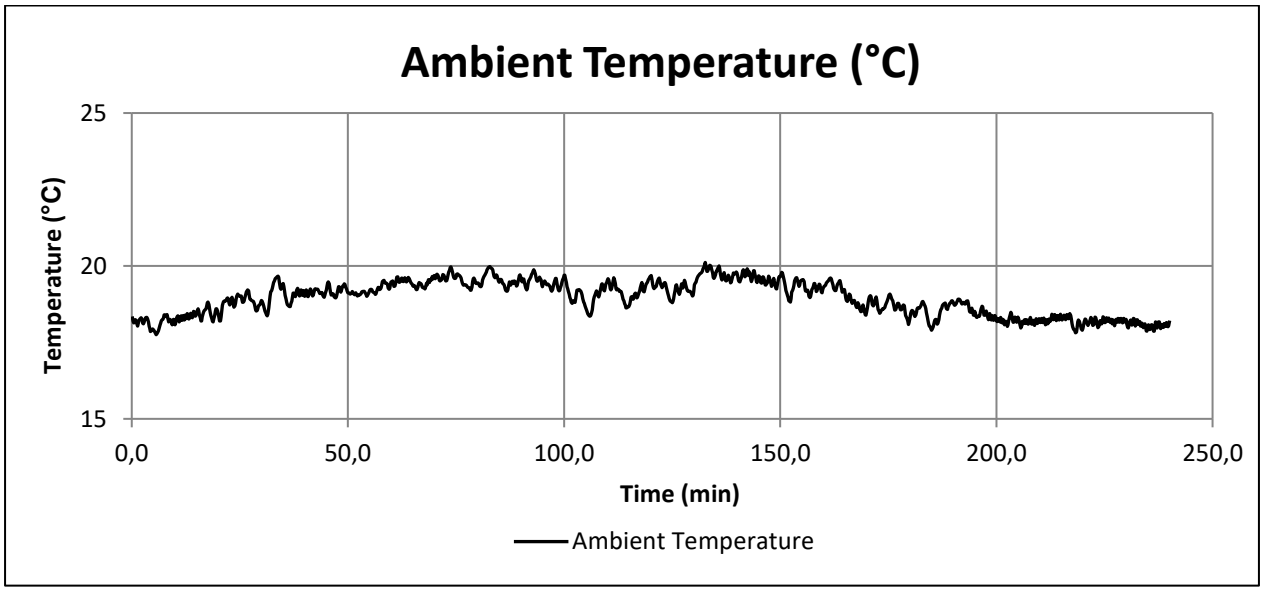

Figure A5: Ambient temperature

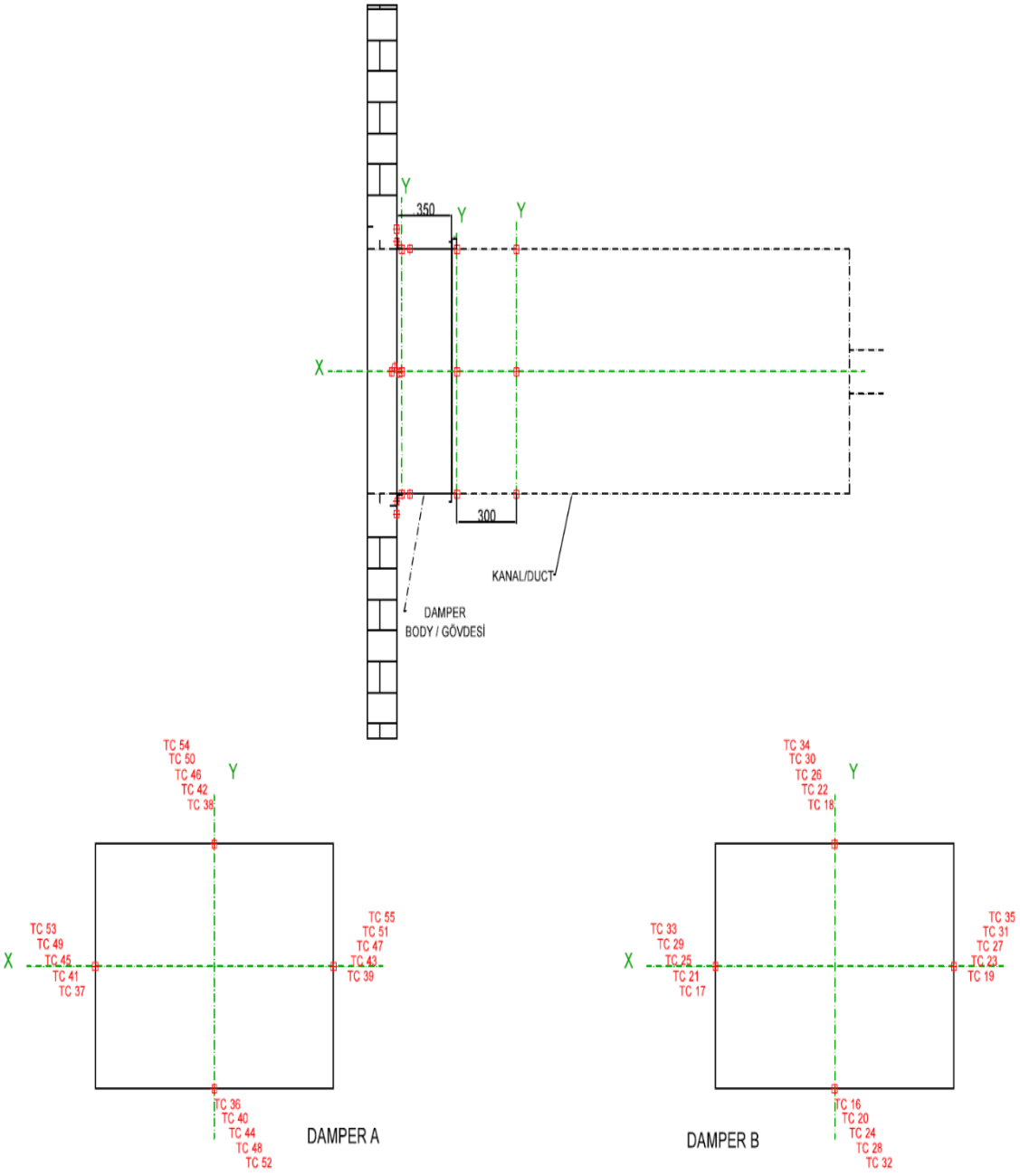

Figure B1: Thermocouple locations

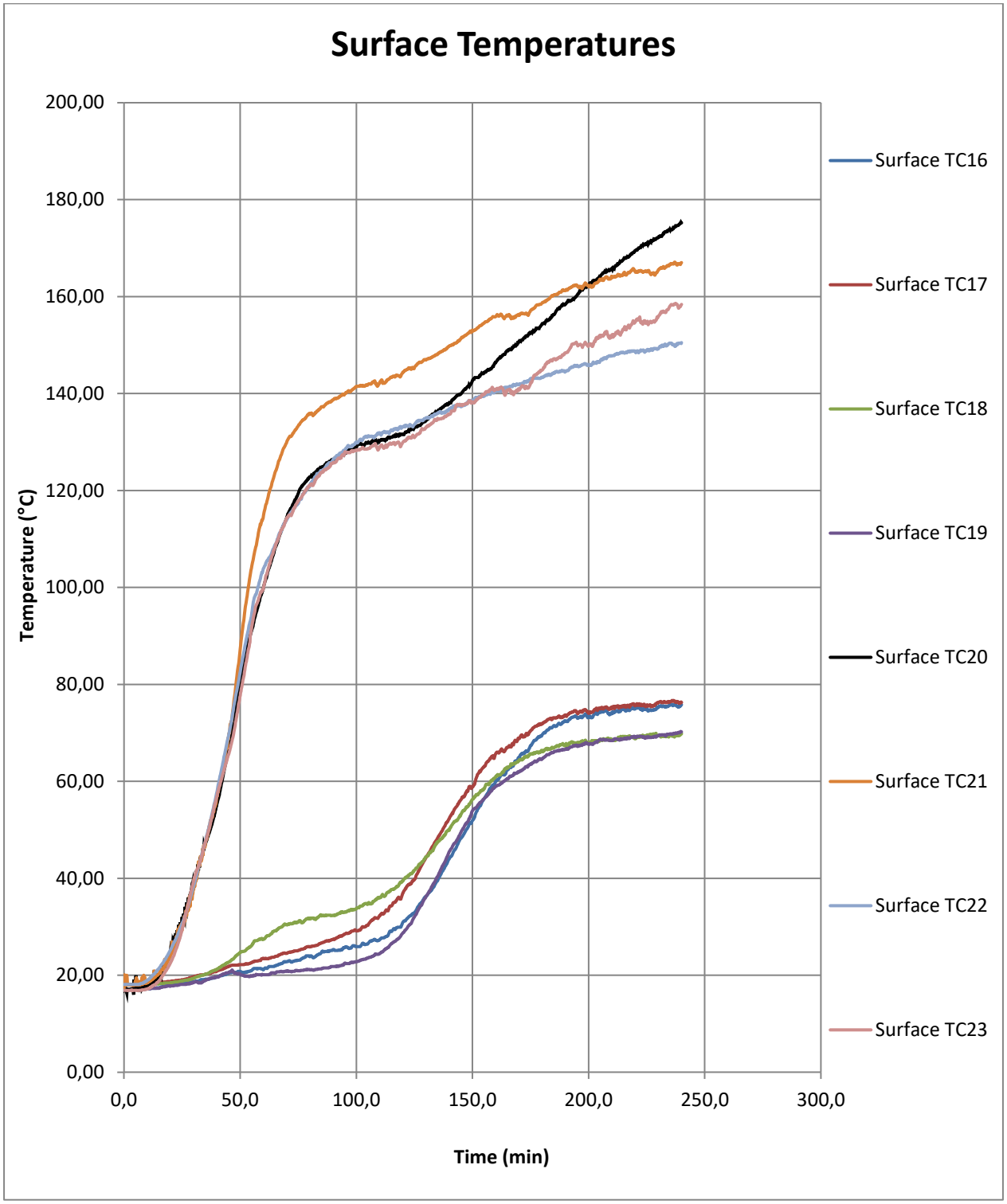

Figure B2: Surface temperatures for Damper No.2

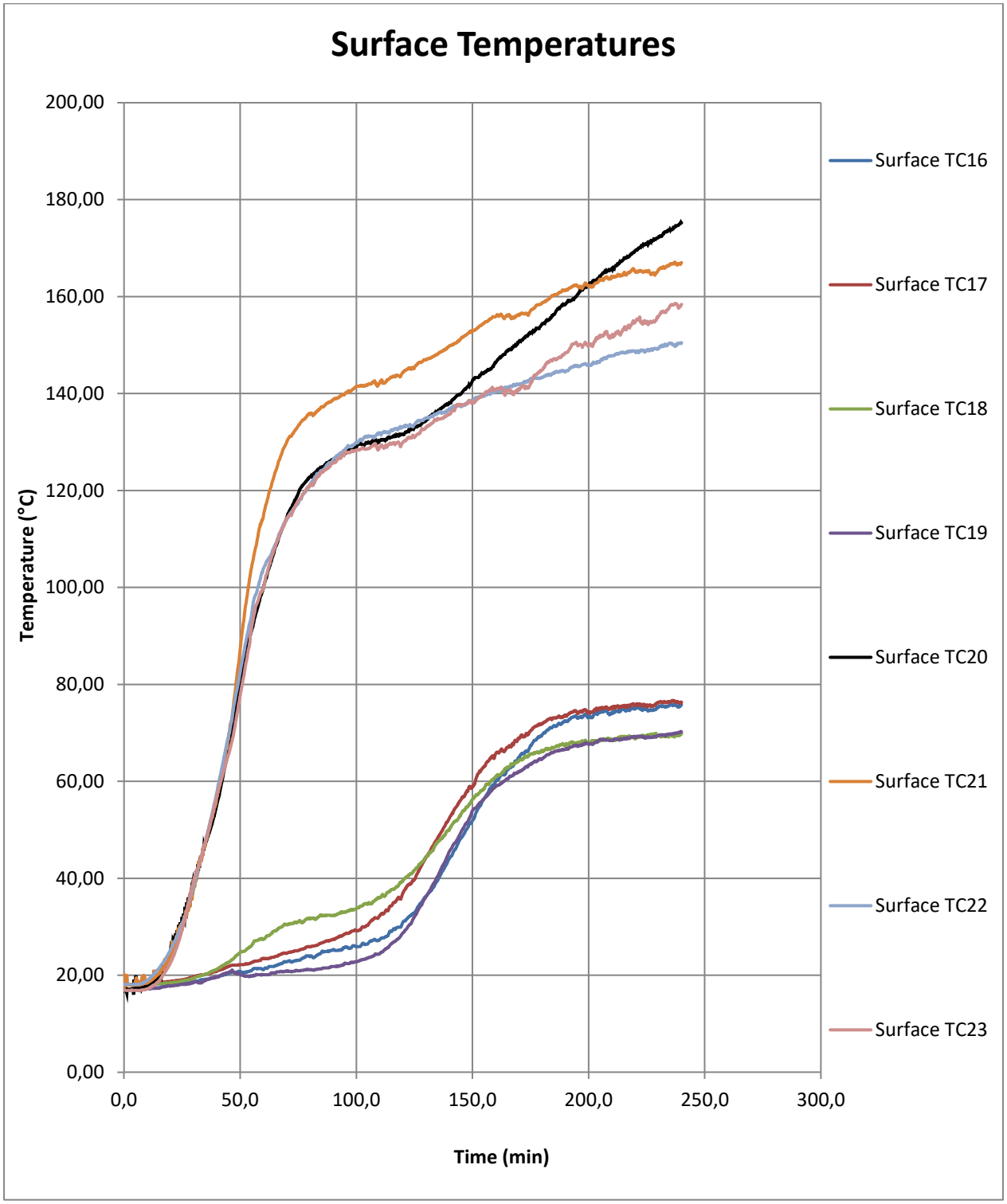

Figure B2: Surface temperatures for Damper No.2

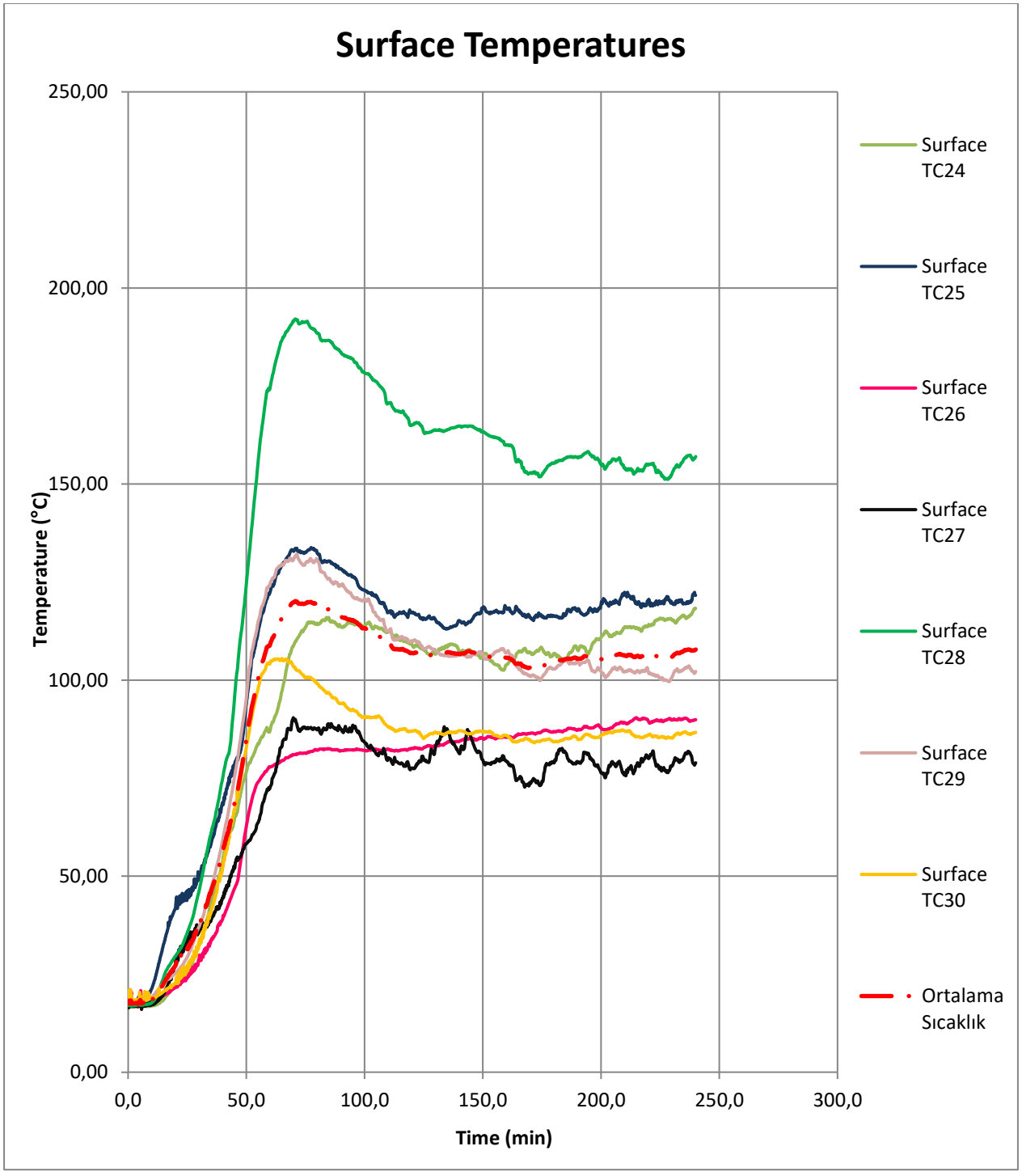

Figure B3: Surface temperatures for Damper No.2

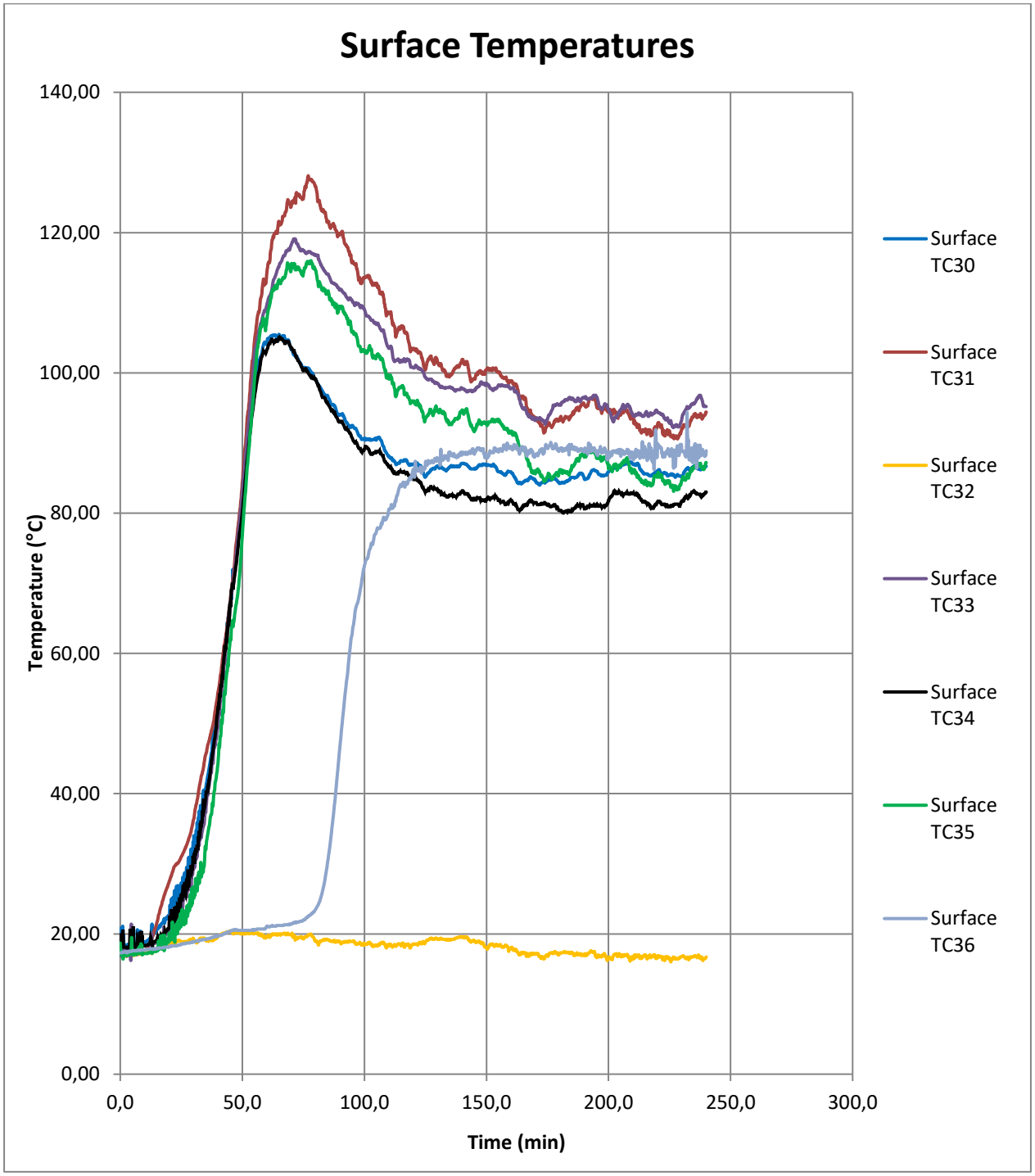

Figure B4: Surface temperatures for Damper No.2

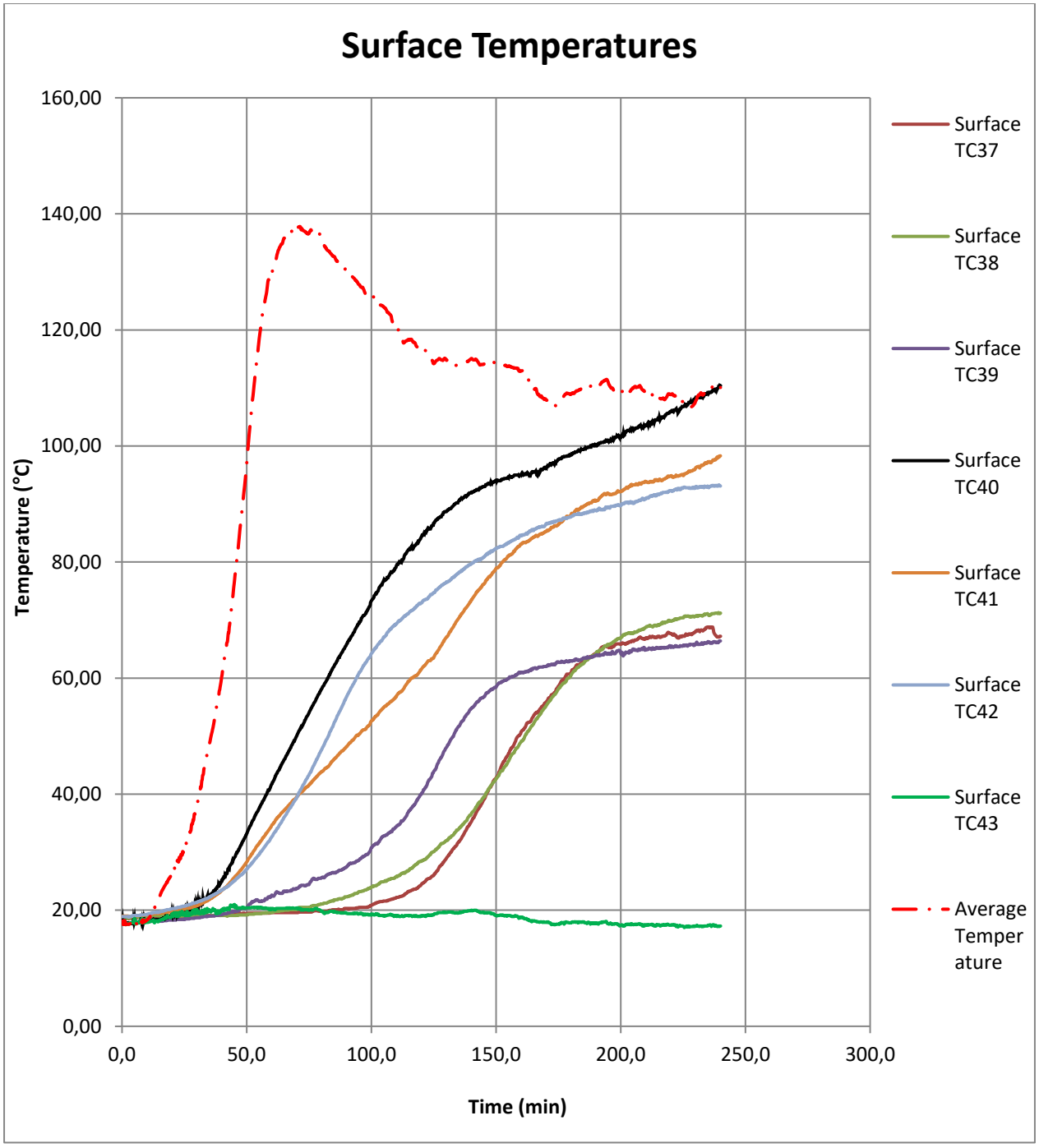

Figure B5: Surface temperatures for Damper No.1

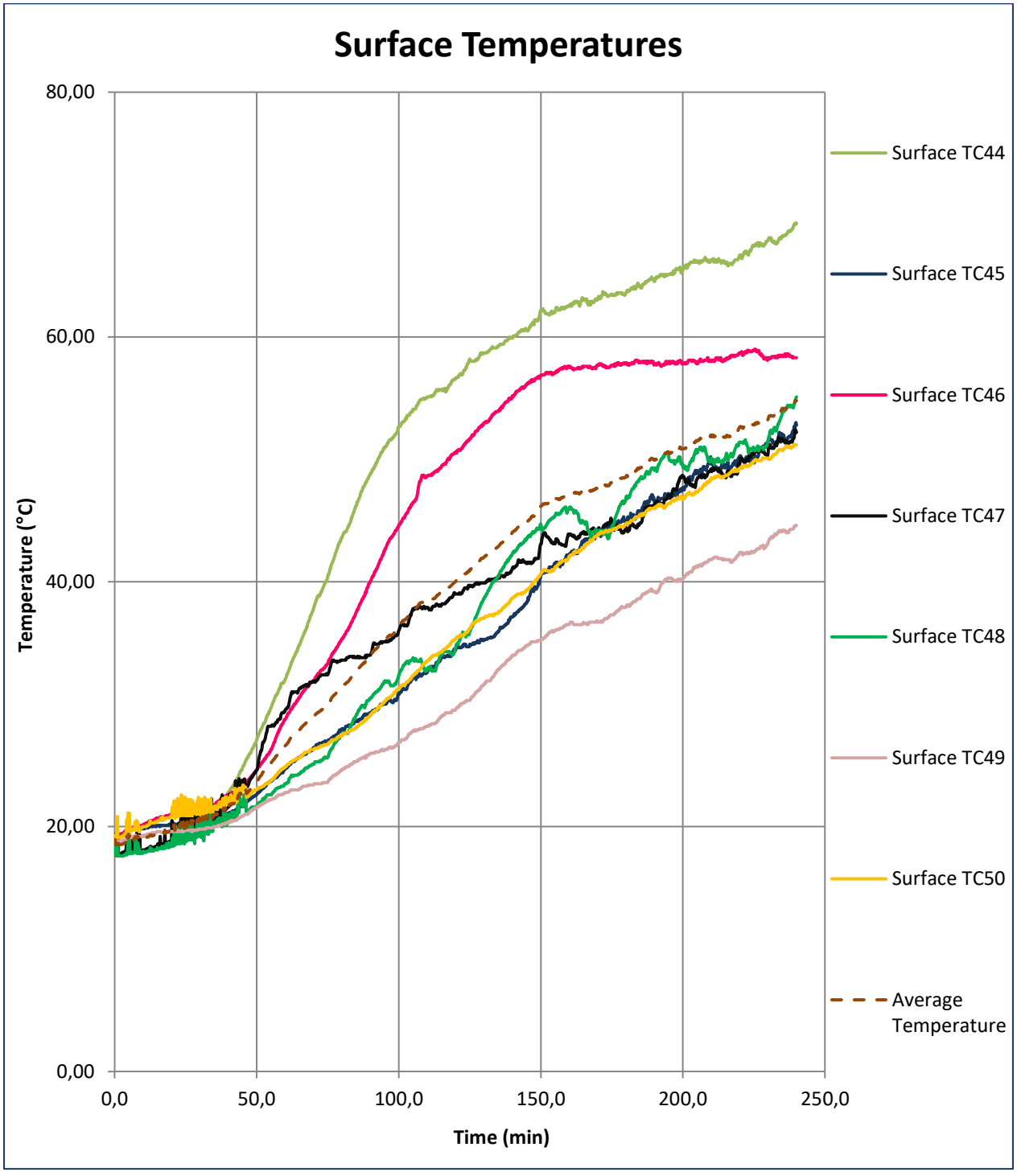

Figure B6: Surface temperatures for Damper No.1

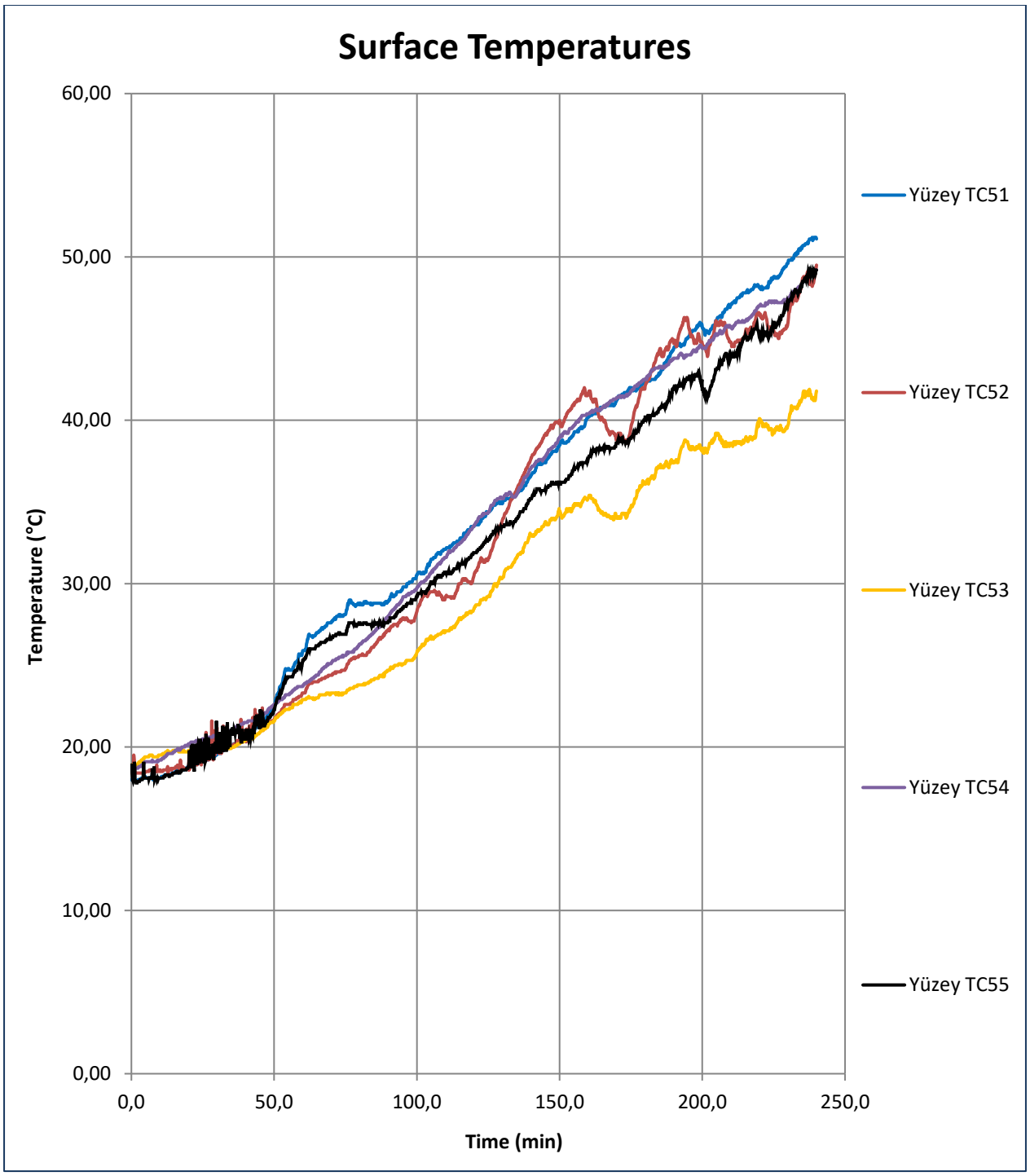

Figure B7: Surface temperatures for Damper No.1

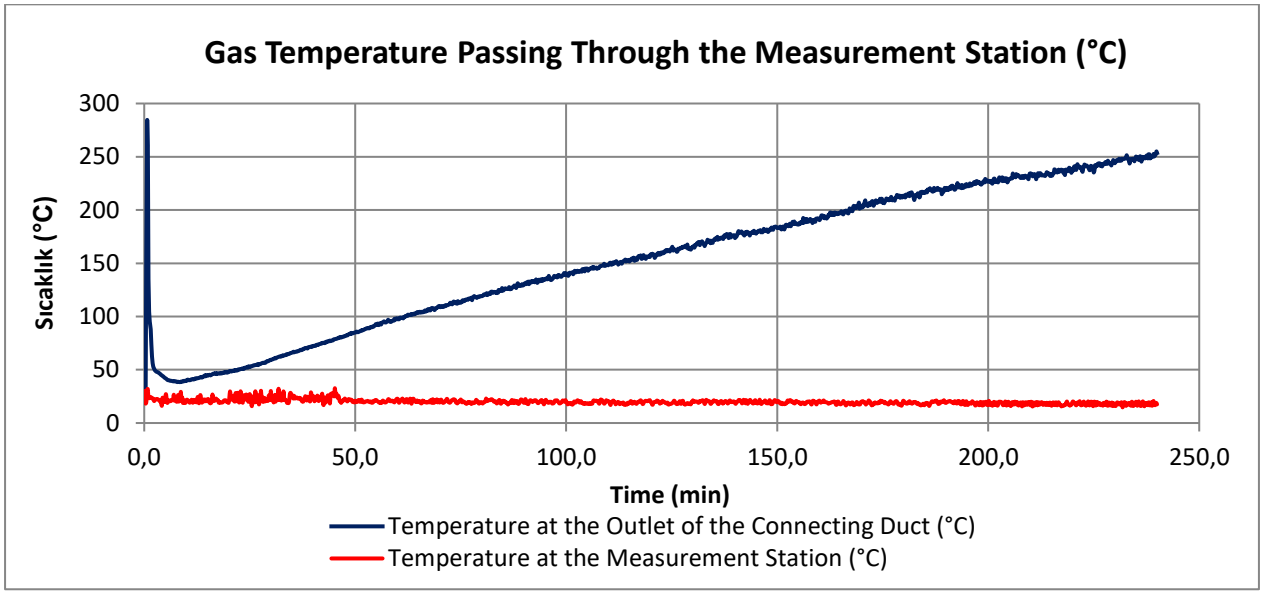

Figure B8: Gas temperature measured at the measurement section of Damper A and along the connecting duct.

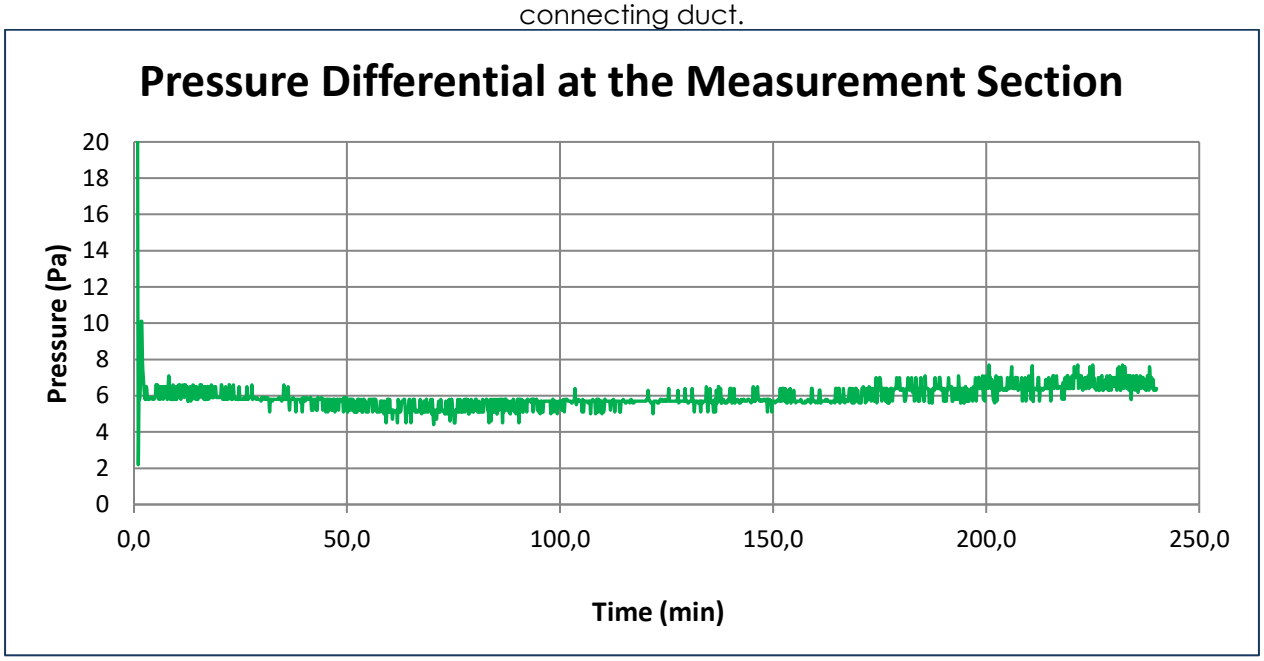

Figure B9: Pressure differential at the measurement station of Damper A.

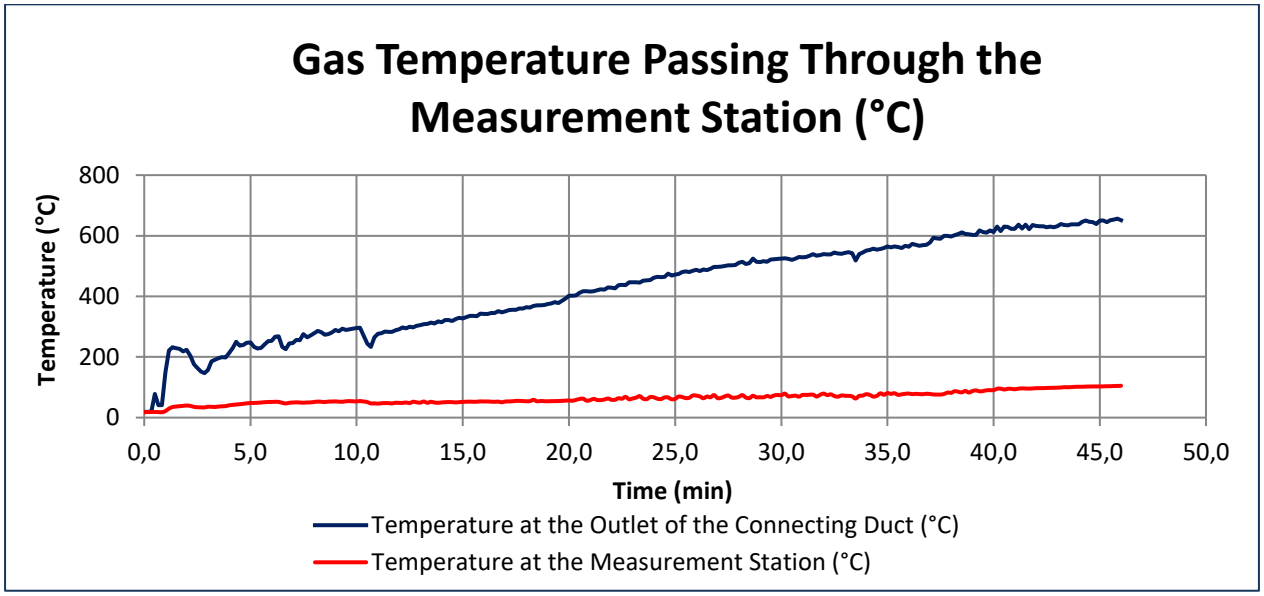

Figure B10: Gas temperature at the measurement section of Damper B.

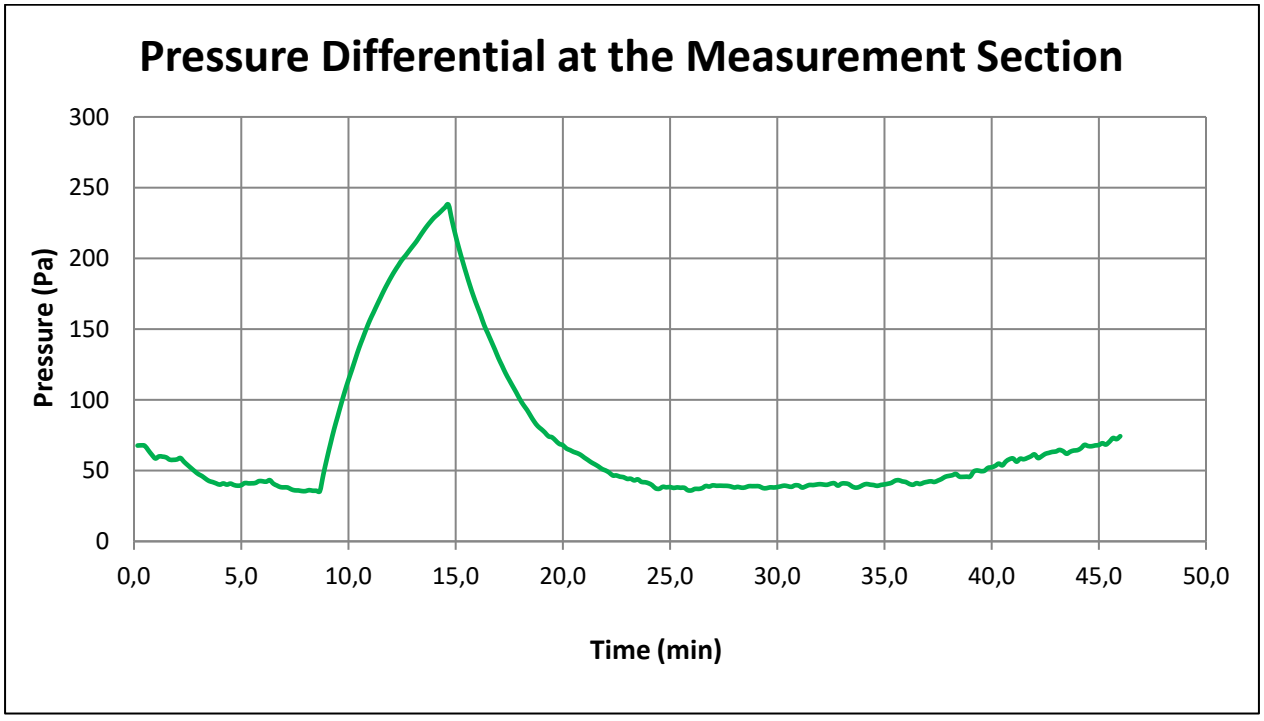

Figure B11: Pressure differential at the measurement station of Damper B.

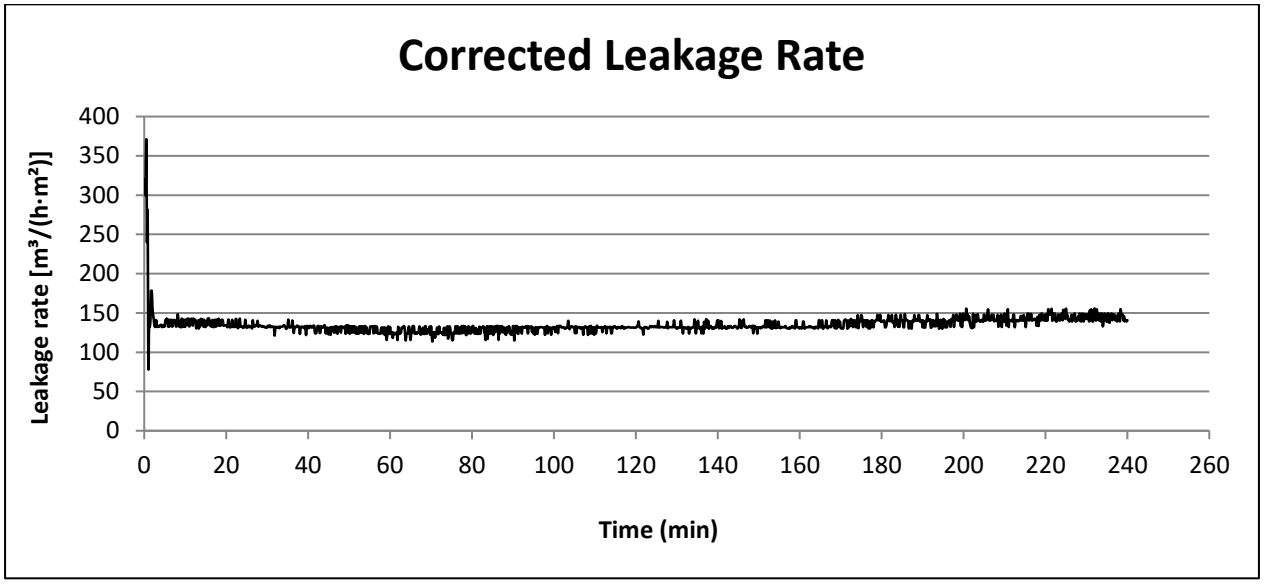

Figure B12: Calculated volumetric flow rate of Damper A, corrected to 20 °C.

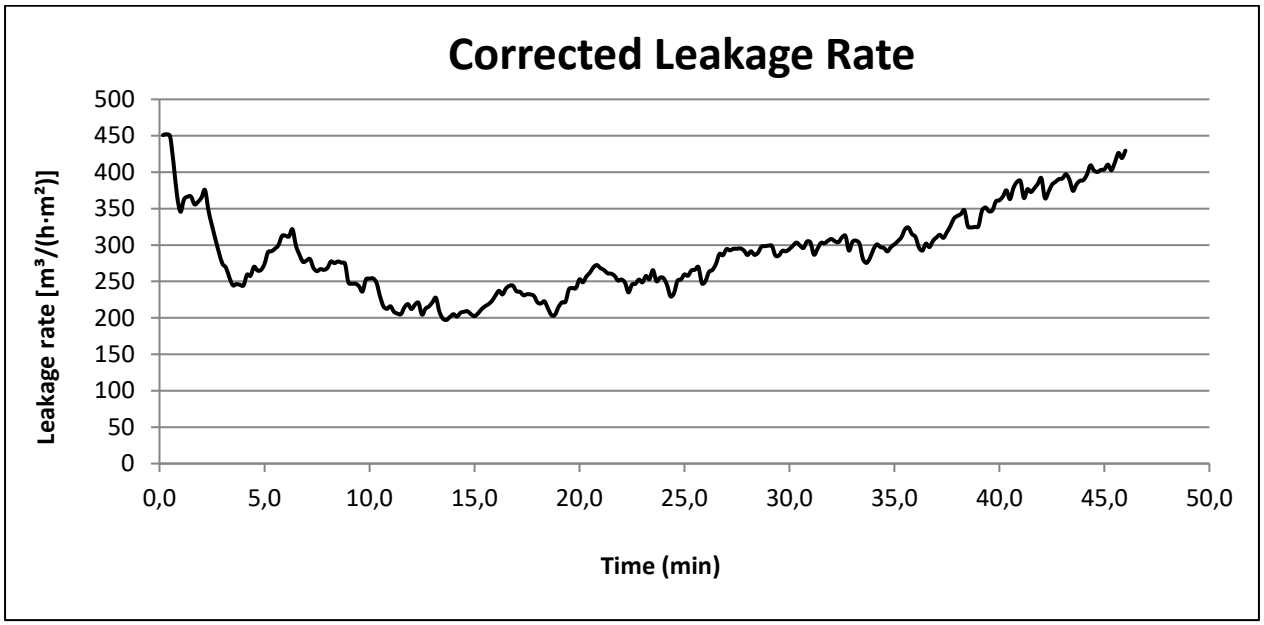

Figure B13: Calculated volumetric flow rate of Damper B, corrected to 20 °C.

Photo C1: Exposed side of the specimen before the fire test

Photo C2: Unexposed side before the fire test

Photo C3: Unexposed side after the fire test

Phone: +902626581662 Fax: +902626581669 E-mail: turkiye@efectis.com Web: www.efectis.com

Photo C4: Exposed side after the fire test