Vehicle Certification Agency

VCA, 1 Eastgate Office Centre,
Eastgate Road, Bristol, BS5 6XX, United Kingdom
enquiries@vca.gov.uk | www.dft.gov.uk/vca | +44(0) 300 330 5797

Report Number: TSU435670 Issue: 0



# Test Report: Reference Axle

## Legislation

Commission Regulation (EU) No 2015/68 Consolidated to Regulation (EU) No 2016/1788, Annex VII

## Test Details

| | |
|---|---|
| Location of Test: | Saraçoğlu Test Track – Telsiz Street No:26<br>Karatay / Konya / Turkey |
| Date of Test: | 10.07.2018 |
| VCA Representative(s): | Serdar Şahbudak, S. Oğuz Eşkut |
| Manufacturer's Representative(s): | Mehmet İngör |
| Reason for Test Report: | ~~New approval / Extension of approval~~ / Test report only |

## Manufacturer Details

| | |
|---|---|
| Name and Address: | ÖZKOÇ İLAVE DİNGİL SAN. TİC. LTD. ŞTİ.<br>Konya Organize Sanayi Bölgesi 13. Sk. No:5 PK:42050<br>Selçuklu / Konya / Turkey |
| Type: | RMK 3210 |
| Commercial Description: | 325/100 |
| Category: | R3a, R3b, R4a, R4b |

## Conclusion

The above mentioned component was tested in accordance with the above mentioned legislation and was found to comply in all respects. This report relates only to the items tested.

| | Test witnessed by*: | Test approved by*: |
|---|---|---|
| Signature: |  |  |
| Name: | S. Oğuz Eşkut | Serdar Şahbudak |
| Position: | Type Approval Engineer | |
| Date: | 01.08.2018 | |

**To be signed by different persons, even when the Technical Service and Approval Authority are the same or alternatively, a separate Approval Authority authorisation is issued with the report.*

## List of Annexes

| Annex | No of Pages | Subject |
|---|---|---|
| I | 5 | Information Document. Document no: OKC RMK-001 rev. 00 dated 05.07.2018 |

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## Worst Case Rationale

The axle type ID1- RMK 3210 which is fitted with ID2- 325*100 braking system, was tested according to the regulation. There is no axle or brake variant and only one tyre dimension. For that reason test results are only valid for the tested axle type.

*Note: Include information on variants and versions this report covers, as applicable. Supporting documents may be annexed to this report.*

## Tests Required

| | Yes, NA, See Report … / Approval … / Annex … |
|---|---|
| General: | Yes |
| Test Record: | Yes |

## Component Specification

| | |
|---|---|
| Axle Identification Number: | ID1- RMK 3210 |

## Manufacturer's Documentation

| | |
|---|---|
| Manufacturer's documentation is complete and reflects the agreed specification for the component tested and covers all variants and versions agreed in the worst case rationale. | Yes |

## Facility and Equipment Checks

| | |
|---|---|
| Calibration certificates checked and valid, recorded in the following table: | Yes |

| Equipment | Serial / Certificate No. | Calibration due* |
|---|---|---|
| V-Box | 28 / E2417 | 27.02.2019 |
| Manometer | 127 / 17-61556<br>128 / 17-61555<br>129 / 17-61554 | 02.12.2018 |
| Laser Thermometer | 96 / 17-61720 | 02.12.2018 |
| Tyre Pressure Gauge | 72 / 17-41817 | 12.08.2018 |
| Tape Measure | 91 / 17-61270 | 05.12.2018 |

**Specify calibrated date + (interval) or calibration due date.*

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| **Test Requirements** | Complies Yes / NA |
|---|---|

**General**

*Note: Test report as prescribed in section 3.9 of Annex 7 of EU 2015/68*
*Note: Paragraph references are to Annex 11, Appendix 3 of Regulation 13.11*

*1.1.* Axle manufacturer name and address:

ÖZKOÇ İLAVE DİNGİL SAN. TİC. LTD. ŞTİ.
Konya Organize Sanayi Bölgesi 13. Sk. No:5 PK:42050
Selçuklu / Konya / Turkey

*1.1.1.* Make of axle manufacturer: TRAX

*1.2.* Brake manufacturer name and address:

See Item 1.1.

*1.2.1.* Brake identifier ID2-: 325*100

*1.2.2.* Automatic brake adjustment device:

- ~~Integrated~~*
- Non-integrated*

**Strikethrough, as appropriate.*

*1.3.* Manufacturer's information document: OKC RMK-001

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## Test Record

*The following data is recorded for each test:*

| | | | |
|---|---|---|---|
| *2.1.* | Test code: | ID4 – TSU435670 | |
| *2.2.* | Test specimen:<br>Test variant: | Drum Brake<br>S-Cam Brake | |
| *2.2.1.* | Axle code: | See item 2.2.1.1, 2.2.1.2. | |
| *2.2.1.1.* | Axle identifier: | ID1- RMK 3210 | |
| *2.2.1.2.* | Identification of tested axle: | RMK 3210 | |
| *2.2.1.3.* | Test axle load (Fe identifier): | ID3- 5178 | |
| *2.2.2.* | Brake: | See item 2.2.2.1, 2.2.2.2. | |
| *2.2.2.1.* | Brake identifier: | ID2- 325*100 | |
| *2.2.2.2.* | Identification of tested brake: | 325*100 | |
| *2.2.2.3.* | Maximum stroke capability of the brake:<br>*Note: Applies to disc brakes only.* | NA | mm |
| *2.2.2.4.* | Effective length of the cam shaft:<br>*Note: Applies to drum brakes only.* | 700 | mm |
| *2.2.2.5.* | Material variation:<br>*Note: As per paragraph 3.8 (m) of this Annex.* | NA | |
| *2.2.2.6.* | Brake:<br>- Drum*<br>- ~~Disc~~*<br>**Strikethrough, as appropriate.* | | |
| *2.2.2.6.1.* | Actual test mass of drum/~~disc~~:<br>**Strikethrough, as appropriate.* | 19,3 | kg |
| *2.2.2.6.2.* | Nominal external diameter of disc:<br>*Note: Applies to disc brakes only.* | NA | mm |
| *2.2.2.6.3.* | Type of cooling of the disc:<br>- ~~Ventilated~~*<br>- ~~Non-ventilated~~*<br>**Strikethrough, as appropriate.* | | |

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| | | |
|---|---|---|
| *2.2.2.6.4.* | Integrated hub:<br>- ~~With~~*<br>- ~~Without~~*<br>**Strikethrough, as appropriate.* | |
| *2.2.2.6.5.* | Disc with integrated drum:<br>- ~~With parking brake function*~~<br>- ~~Without parking brake function~~*<br>**Strikethrough, as appropriate.*<br>*Note: Applies to disc brakes only.* | |
| *2.2.2.6.6.* | Geometric relationship between disc friction surfaces and disc mounting:<br>*Examples: One piece, casted, connection on action side.* | NA |
| *2.2.2.6.7.* | Base material: | Grey Cast Iron |
| *2.2.2.7.* | Brake:<br>- Lining*<br>- ~~Pad~~*<br>**Strikethrough, as appropriate.* | |
| *2.2.2.7.1.* | Manufacturer: | Eren Balatacılık San. Ve Tic. A.Ş. |
| *2.2.2.7.2.* | Make: | EREN |
| *2.2.2.7.3.* | Type: | 44561 |
| *2.2.2.7.4.* | Method of attachment:<br>- Lining*<br>- ~~Pad~~ on the brake shoe*<br>- ~~Back plate~~*<br>**Strikethrough, as appropriate.* | Riveted |
| *2.2.2.7.5.* | ~~Thickness of back plate~~:<br>Weight of shoes:<br>**Strikethrough, as appropriate.* | NA mm*<br>3,00 kg* |
| *2.2.2.7.6.* | Base material:<br>- ~~Back plate~~*<br>- Brake shoe*<br>**Strikethrough, as appropriate.* | Steel (St 37) |
| *2.2.3.* | Automatic brake adjustment device:<br>**Not applicable in the case of integrated automatic brake adjustment device.* | See item 2.2.3.1, 2.2.3.2, 2.2.3.3, 2.2.3.4 |

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2.2.3.1. Manufacturer name and address:

Haldex Brake Products AB
Instrumentgatan 15 Box 501 261 14
Landskrona / Sweden

2.2.3.2. Make: HALDEX

2.2.3.3. Type: S-ABA

2.2.3.4. Version: 80022

2.2.4. Wheel(s): 285/70R19,5

2.2.4.1. Reference tyre rolling radius ($R_e$) at test axle load ($F_e$): 434 mm

2.2.4.2. Data of the fitted wheel during testing:

| Tyre Size | Rim Size | $X_e$ (mm) | $D_e$ (mm) | $E_e$ (mm) | $G_e$ (mm) |
|---|---|---|---|---|---|
| 285/70R19,5 | 19,5x7,50 | 146 | 180 | 70 | +55 |

*Note: For dimensions, see Figures 1A and 1B in Appendix 5 to Annex 11 of Regulation 13.11*

2.2.5. Lever length le: 180 mm

2.2.6. Actuator: See item 2.2.6.1, 2.2.6.2, 2.2.6.3, 2.2.6.4

2.2.6.1. Manufacturer: Moniva Otomotiv Gıda San. Tic. A.Ş.

2.2.6.2. Make: MONIVA

2.2.6.3. Type: 16/24 Spring Brake Chamber

2.2.6.4. (Test) identification number: TSS377051

2.3. Test results: See below

*Note: Corrected to take account of rolling resistance of 0.02·$F_e$ (in case of vehicles of categories Ra) and 0.01·$F_e$ (in case of vehicles of categories Rb)*

2.3.1. In the case of vehicles of categories R1, R2, R3a, R4a and R3b where the sum of technically permissible masses per axle does not exceed 10.000 kg, has been subject to the Type I test:

| Test Type | 0 | I | |
|---|---|---|---|
| Annex 7, paragraph: | 3.5.1.4 | 3.5.2.2/3 | 3.5.2.4 |
| Test speed (km/h) | 40 | 40 | 40 |
| Brake actuator pressure $p_e$ (kPa) | 650 | 100 | 650 |
| Braking period (mins) or (~~km/h~~) | - | 2,33 | - |
| Braking force developed $T_e$ (daN) | 2819 | 363 | 2613 |
| Brake efficiency $T_e/F_e$ | 0,54 | 0,07 | 0,50 |
| Actuator stroke $s_e$ (mm) | 50 | - | 50 |
| Brake input torque $C_e$ (Nm) | 1202 | - | 1202 |
| Brake input threshold torque $C_{0,e}$ (Nm) | 30 | - | 30 |

2.3.2. In the case of vehicles of categories

- R3a, R4a
- R3b where the sum of technically permissible masses per axle does not exceed 10.000 kg,
- R3b and R4b where the sum of technically permissible masses per axle exceeds 10.000 kg, has been subject to the Type III test:

| Test Type | 0 | III | |
|---|---|---|---|
| Annex 7, paragraph: | 3.5.1.4. | 3.5.3.1. | 3.5.3.2. |
| Initial test speed (km/h) | 60 | 60 | 60 |
| Final test speed (km/h) | 0 | 40 | 0 |
| Brake actuator pressure $p_e$ (kPa) | 650 | 280 | 650 |
| Number of brake applications | - | 20 | - |
| Duration of brake cycle | - | 60 | - |
| Braking force developed $T_e$ (daN) | 2871 | 1553 | 2508 |
| Brake efficiency $T_e/F_e$ | 0,55 | 0,30 | 0,48 |
| Actuator stroke $s_e$ (mm) | 50 | - | 50 |
| Brake input torque $C_e$ (Nm) | 1202 | - | 1202 |
| Brake input threshold torque $C_{0,e}$ (Nm) | 30 | - | 30 |

2.3.3. *This item is to be completed only when the brake has been subject to the test procedure defined in paragraph 4 of Annex 19 to Regulation 13.11, to verify the cold performance characteristics of the brake by means of the brake factor (BF).*

2.3.3.1. Brake factor $B_F$: 5,50

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| | | |
|---|---|---|
| *2.3.3.2.* | Declared threshold torque $C_{0,dec}$: | 30 Nm |
| *2.3.4* | Performance of the automatic brake adjustment device, if applicable. See item 2.3.4.1 | |
| *2.3.4.1.* | Free running according to paragraph 3.6.3 of Annex 7<br>- Yes*<br>- ~~No~~*<br>**Strikethrough, as appropriate.* | |

**Application Range**

| | | |
|---|---|---|
| *3.* | Application range specifies the axle/brake variants that are covered in this test report, by showing which variables are covered by the individual test codes. | NA |
| *4.* | Test has been carried out and the results reported, in accordance with Annex 7 to Regulation (EU) No. 2015/68 | Yes |
| *4.* | At the end of the test defined in paragraph 3.6 of Annex 7, the requirements of paragraph 2.2.2.8.1 of Annex I are deemed to be fulfilled.<br>*Note: Only to be completed when an automatic brake wear adjustment device is installed.* | Yes |

**Remarks**

None

*Note: VCA apply measurement uncertainty to calibrated items but not test results.*

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## 1. GENERAL

| | | |
|---|---|---|
| | Name and address of axle or vehicle manufacturer | ÖZKOÇ İLAVE DİNGİL SAN. TİC. LTD. STİ.<br>Konya Organize Sanayi Bölgesi 13. Sk. No:5<br>PK:42050<br>Selçuklu / Konya / Turkey |
| 1.1. | Commercial Description | 325/100 |
| 1.2. | Category | R3a, R3b, R4a, R4b |

## 2. AXLE DATA

| | | |
|---|---|---|
| 2.1. | Manufacturer (name and address) | ÖZKOÇ İLAVE DİNGİL SAN. TİC. LTD. STİ.<br>Konya Organize Sanayi Bölgesi 13. Sk. No:5<br>PK:42050<br>Selçuklu / Konya / Turkey |
| 2.1.1. | Make of axle manufacturer | TRAX |
| 2.2. | Type / variant | RMK 3210 |
| 2.3. | Axle identifier | ID1- RMK 3210 |
| 2.4. | Test axle load ($F_e$) | 5178 daN |
| 2.5. | Wheel and brake data according to the following<br>Figures 1A and 1B | |

Figure 1A

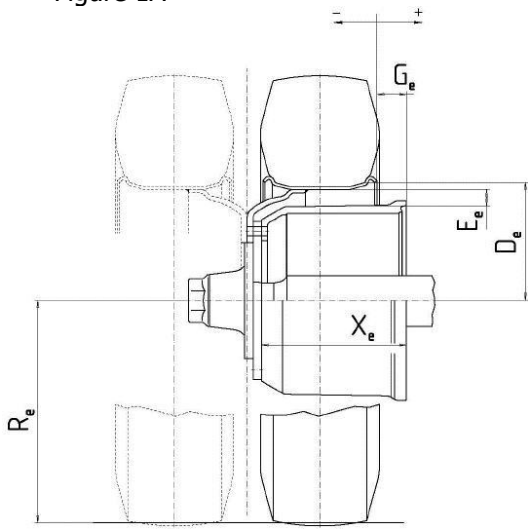
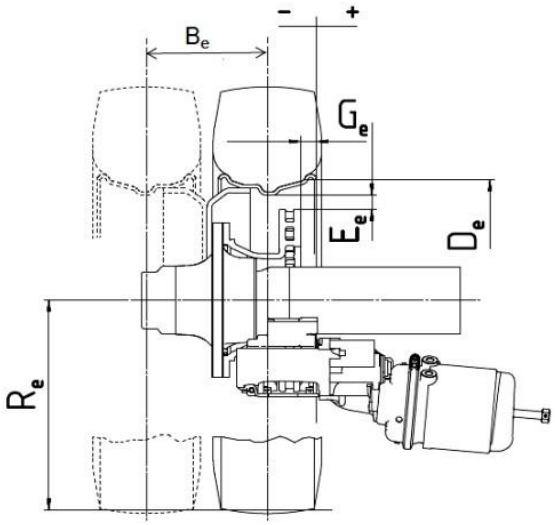



Figure 1B



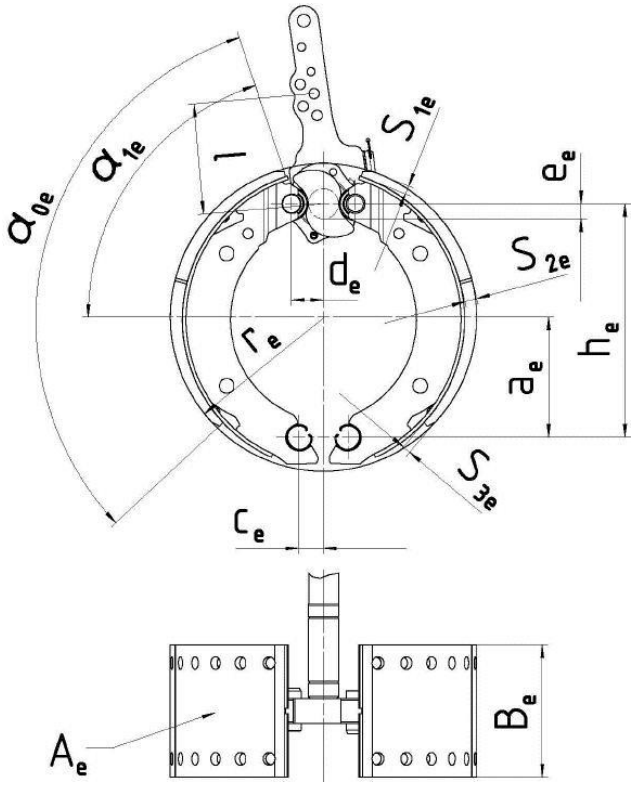

| Tyre | Rim | $D_e$ (mm) | $E_e$ (mm) | $G_e$ (mm) | $R_e$ (mm) | $B_e$ (mm) | $X_e$ (mm) |
|---|---|---|---|---|---|---|---|
| 285/70 R19,5 | 19,5x7,50 | 180 | 70 | +55 | 434 | -- | 146 |

**3. BRAKE**

3.1. *General Information*

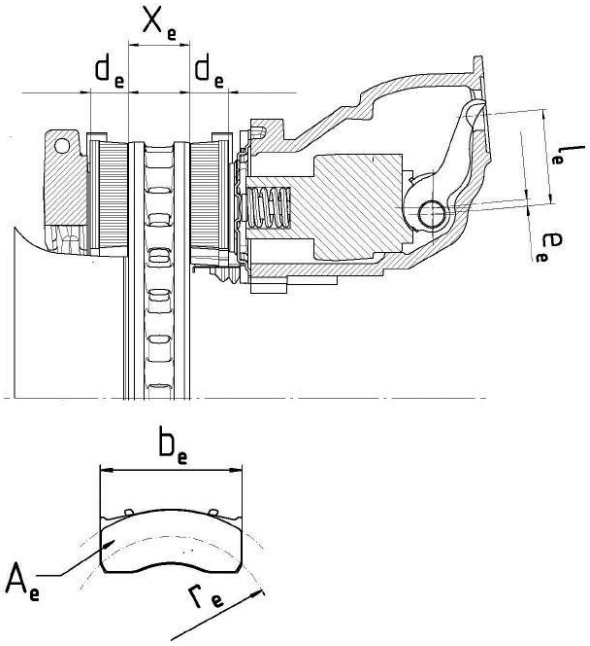
| | | |
|---|---|---|
| 3.1.1. | Name | ÖZKOÇ |
| 3.1.2. | Manufacturer (Name and address) | See item 1. |
| 3.1.3. | Type of brake | Drum Brake |
| 3.1.3.1. | Variant | S-cam Brake |
| 3.1.4. | Brake identifier | ID2- 325*100 |
| 3.1.5. | Brake data according to the following Figures 2A and 2B | |
| 3.1.6 | Brake Factor ($B_f$) | 5,50 |

Figure 2A




| $a_e$ (mm) | $h_e$ (mm) | $c_e$ (mm) | $d_e$ (mm) | $e_e$ (mm) | $a_{0e}$ (°) | $a_{1e}$ (°) | $B_e$ (mm) | $r_e$ (mm) | $A_e$ ($cm^2$) | $S_{1e}$ (mm) | $S_{2e}$ (mm) | $S_{3e}$ (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 115 | 225 | 0 | 13 | 15 | 109 | 54 | 100 | 162,5 | 508,5 | 11,60 | 11,60 | 11,60 |

Figure 2B




| $X_e$ (mm) | $d_e$ (mm) | $e_e$ (mm) | $l_e$ (mm) | $b_e$ (mm) | $A_e$ ($cm^2$) | $r_e$ (mm) |
|---|---|---|---|---|---|---|
| -- | -- | -- | -- | -- | -- | -- |

3.2. *Drum brake data*

| | | |
|---|---|---|
| 3.2.1. | Brake adjustment device (external/internal) | External |
| 3.2.1.1. | Manufacturer (Name and address) | Haldex Brake Products AB<br>Instrumentgatan 15 Box 501 261 14<br>Landskrona Sweden |
| 3.2.1.2. | Make | HALDEX |
| 3.2.1.3. | Type | S-ABA |
| 3.2.1.4. | Version | 80022 |
| 3.2.2. | Declared maximum brake input torque ($C_{max}$) | 2900 Nm |
| 3.2.3. | Mechanical efficiency ($\eta$) | 0,95 |
| 3.2.4. | Declared brake input threshold torque ($C_{0,dec}$) | 30 Nm |
| 3.2.5. | Efficiency length of the cam shaft | 700 mm |

3.3. *Brake drum*

| | | |
|---|---|---|
| 3.3.1. | Max. diameter of friction surface (wear limit) | 325 mm |
| 3.3.2. | Base material | Grey Cast iron |
| 3.3.3. | Declared mass | 19 kg |
| 3.3.4. | Nominal mass | 19 kg |
| 3.3.5. | Permitted range of the brake drum mass | 19-24 kg |
| 3.4. | *Brake Lining* | |
| 3.4.1. | Manufacturer (Name and address) | Eren Balatacılık San. Ve Tic. A.Ş.<br>Kemalpaşa Organize Sanayi Bölgesi<br>13. Sokak No:6<br>Kemalpaşa / İzmir / Türkiye |
| 3.4.2. | Make | EREN |
| 3.4.3. | Type | 44561 |
| 3.4.4. | Identification (type identification on lining) | EREN M77 |
| 3.4.5. | Minimum thickness (wear limit) | 5,0 mm |
| 3.4.6. | Method of attaching friction material to brake shoe | Riveted |
| 3.4.6.1. | Worst case of attachment (in the case of more than one) | N/A |
| 3.4.6.2. | Base material of the brake shoe | Steel (St 37) |
| 3.4.6.3. | Range of the weight of the brake shoes (without brake lining) | 3,0 kg |
| 3.5. | *Disk brake data* | |
| 3.5.1. | Connection type to the axle (axial, radial, integrated etc.) | N/A |
| 3.5.2. | Brake adjustment device (external / integrated) | N/A |
| 3.5.3. | Max. actuation stroke | N/A |
| 3.5.4. | Declared maximum input force ($Th_{Amax}$) | N/A |
| 3.5.4.1. | Declared maximum brake input torque ($C_{max}$)<br>$C_{max} = Th_{Amax} * l_e$ | N/A |
| 3.5.5. | Friction radius ($r_e$) | N/A |
| 3.5.6. | Lever length ($l_e$) | N/A |

| | | |
|---|---|---|
| 3.5.7. | Input/output ratio (i) ($l_e/e_e$) | N/A |
| 3.5.8. | Mechanical efficiency ($\eta$) | N/A |
| 3.5.9. | Declared brake input threshold force ($Th_{A0,dec}$) | N/A |
| 3.5.9.1. | $C_{0,dec} = Th_{A0,dec} * l_e$ | N/A |
| 3.5.10. | Minimum rotor thickness (wear limit) | N/A |
| 3.6. | *Brake disc data* | |
| 3.6.1. | Disc type description | N/A |
| 3.6.2. | Connection/mounting to the hub | N/A |
| 3.6.3. | Ventilation (yes/no) | N/A |
| 3.6.4. | Declared mass | N/A |
| 3.6.5. | Nominal mass | N/A |
| 3.6.6. | Declared external diameter | N/A |
| 3.6.7. | Minimum external diameter | N/A |
| 3.6.8. | Inner diameter of friction ring | N/A |
| 3.6.9. | Width of ventilation channel (if appl.) | N/A |
| 3.6.10. | Base material | N/A |
| 3.7. | *Brake pad data* | |
| 3.7.1. | Manufacturer and address | N/A |
| 3.7.2 | Make | N/A |
| 3.7.3. | Type | N/A |
| 3.7.4. | Identification (type identification on pad back plate) | N/A |
| 3.7.5. | Minimum thickness (wear limit) | N/A |
| 3.7.6. | Method of attaching friction material to pad back plate | N/A |
| 3.7.6.1. | Worst case of attachment (in case of more than one) | N/A |