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**CTS** Collaborative Transplant Study

|             |                   |
|-------------|-------------------|
| Manual No.  | 19                |
| Revision    | February 12, 2025 |
| Product No. | 119               |
| Lot No.     | DQB14-1           |

## WORKING INSTRUCTION

### HLA-DQB1\*low resolution CTS-PCR-SSP TRAY KIT

#### LOCUS- AND LOT-SPECIFIC MANUAL

To be applied to the following product:

| Product No. | Description                                                                                                                         |
|-------------|-------------------------------------------------------------------------------------------------------------------------------------|
| 119         | HLA-DQB1* low resolution CTS-PCR-SSP Tray Kit  |

#### 1. Main differences

- **Between Lot DQB14-1 (the current lot) and Lot DQB14-0:**  
The kit was updated to cover new alleles included in the IMGT/HLA Database of January 2024. Deleted and renamed alleles were taken into consideration.
- **Between the current version of the manual (February 12, 2025) and the version of June 12, 2024 (both are manuals of Lot DQB14-1):**  
Section 9 (Special notes): A remark was added (Amplification control can be weak: Mix 9).

#### 2. Introduction

- **Intended use:** This kit provides reagents for low/ intermediate resolution HLA-DQB1 typing using the PCR-SSP method. All serologically detectable HLA-DQ antigens as well as their serological splits can be assigned. In addition, some of the DNA-specificities which cannot be identified by serology can be detected by the kit.
  - Allele coverage: IMGT/HLA Sequence Database Release 3.55.0, January 2024, **except** HLA-DQB1\*02:25/02:35/02:40/02:72/02:147, DQB1\*04:02:02/04:02:08/04:02:22/04:02:23/04:31/04:48, DQB1\*05:01:01:31-34/05:01:14/05:01:49/05:02:28/05:03:01:10/05:03:10/05:03:31/05:21/05:60/05:72-05:73/05:82/05:98/05:105/05:116/05:175/05:207/05:218/05:258/05:300/05:319-325, DQB1\*06:09:04/06:22:01/06:22:03/06:69:02/06:153:01-06:153:02/06:167/06:231/06:247/06:260/06:301/06:318/06:332/06:342/06:415/06:417/06:441  
These alleles are considered to be rare.
- This manual is only valid for **Lot No. DQB14-1**.
- This manual should be used together with the Main Manual (General Information) which is the 'Working instruction for the CTS-PCR-SSP **TRAY and MINITRAY KITS**' (Manual No. 100A).

### 3. Content

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| <b>Table 1:</b> Allele specificities and sizes of the PCR products of each <b>HLA-DQB1*</b> CTS-PCR-SSP primer mix ( <b>Lot No. DQB14-1</b> ) based on IMGT/HLA Sequence Database Release 3.55.0, January 2024 ..... | 5 |
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|                                                                                                                                                                                                                         |    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Table 2:</b> Amplification patterns for all <b>HLA-DQB1*</b> alleles detected by the HLA-DQB1* CTS-PCR-SSP reagents ( <b>Lot-No DQB14-1</b> ) based on IMGT/HLA Sequence Database Release 3.55.0, January 2024 ..... | 14 |
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#### 4. Kit Composition

- Number of PCR primer mixes per test: 14:
  - 13 HLA-specific mixes
  - 1 negative control mix
- Please note: Wells (positions on tray) B2-A2, B4-A4, B6-A6, B8-A8, B10-A10 and B12-A12 are empty.
- Number of tests per tray: 6
- Number of trays per kit: 10
- The primer mixes are aliquoted and lyophilized in PCR-Trays.
- PCR buffer: 3.0 ml of Mastermix SSP (without Taq polymerase)

For storage condition, please refer to Section 1 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

#### 5. Materials, Reagents and Equipment not supplied

Please refer to Section 2 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

#### 6. Sample Requirements, PCR and Gel Electrophoresis

Please refer to Section 3 to 6 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

#### 7. Result Evaluation

- Check the approximate size of the PCR product against the Primer Mix Specificity Table (Appendix / Table 1) to confirm the correct product size.
- Use the Amplification Pattern Table (Appendix / Table 2) to make the allele assignments or use the SCORE Software for detailed result interpretation.

#### 8. Interpretation Hints

- Weak or false positive reactions can occur if you use a different Taq polymerase. Also the quality and quantity of DNA is a crucial factor and can affect the mix reactivities.
- Alleles that are known to amplify weakly are listed with "w" (= weak) in the tables (Appendix). Under suboptimal test conditions, some mixes of this lot are particularly prone to give false positive reactions and are indicated in Section 9.
- Please refer to Section 7 and 8 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

#### 9. Special notes

- Differentiation of HLA-DQB1\*03 serological equivalents: Mix 6 and 7 mainly detect HLA-DQB1\*03 alleles which belong to the serological group of HLA-DQ7(3). Mix 8 and 9 react positively with HLA-DQB1\*03 alleles of the HLA-DQ8(3) serological group, whereas mix 10 and 11 amplify HLA-DQB1\*03 alleles which can serologically be defined as HLA-DQ9(3). Some other less common alleles are amplified by these mixes in addition.  
Mix 12: The majority of HLA-DQB1 alleles amplified by mix 12 result in two PCR fragments (110/160 bp), except HLA-DQB1\*03:05 and some rare alleles that generate only one PCR fragment (110 bp).
- Some mixes contain specific primers which may give rise to PCR fragments of **two** different sizes simultaneously (see Table 1).
- Potentially false positive reactions: Mixes **9** and **11**.
- Amplification control can be weak: Mix **9**.

#### 10. Troubleshooting

Please refer to Section 8 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

## **11. Precaution**

Please refer to Material Safety Data Sheet for the CTS-PCR-SSP TRAY and MINITRAY KITS (Manual No. 100B) supplied along with this product.

## **12. Contact**

If you have any particular questions concerning this kit, which are not answered in this or the Main Manual, please do not hesitate to contact us at:

Phone: +49 6221 564013

Fax: +49 6221 564200

E-mail: [dna.labor@med.uni-heidelberg.de](mailto:dna.labor@med.uni-heidelberg.de)

### 13. Appendix

**Table 1:** Allele specificities and sizes of the products of each **HLA-DQB1\*** CTS-PCR-SSP primer mix (**Lot No. DQB14-1**) based on IMGT/HLA Sequence Database Release 3.55.0, January 2024

| Position |    |    |    |    |     | Mix   | Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Serology        | Size      |
|----------|----|----|----|----|-----|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-----------|
| H1       | H3 | H5 | H7 | H9 | H11 | Mix 1 | DQB1*04:10w, DQB1*05:01:01:01-05:01:01:30/05:01:02-05:01:13/05:01:15/05:01:16w/05:01:17-05:01:18/05:01:19w/05:01:20-05:01:48/05:02:01:01-05:02:27/05:03:01:01-05:03:01:09/05:03:02-05:03:09/05:03:11-05:03:24/05:03:25w/05:03:26-05:03:30/05:04-05:20:02/05:22-05:25/05:26w/05:27-05:33/05:34w/05:35-05:43:02/05:44w/05:45-05:59/05:61-05:71/05:74-05:81/05:83-05:97/05:99-05:104/05:106-05:112/05:113w/05:114-05:115/05:117-05:127/05:128Nw/05:129/05:130w/05:131-05:170/05:171w/05:172-05:174/05:176-05:206N/05:208N-05:217/05:219-05:227/05:228w/05:229-05:257/05:259-05:299/05:301/05:302w/05:303-05:318, DQB1*06:23/06:156/06:162/06:169/06:325 | -, DQ5(1), Null | see below |
|          |    |    |    |    |     |       | DQB1*04:10w, DQB1*05:03:02/05:43:02/05:301, DQB1*06:23/06:156/06:162/06:169                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | -, DQ5(1)       | 135 bp    |
|          |    |    |    |    |     |       | DQB1*05:01:01:01-05:01:01:30/05:01:02-05:01:13/05:01:15/05:01:16w/05:01:17-05:01:18/05:01:19w/05:01:20-05:01:48/05:02:01:01-05:02:27/05:03:01:01-05:03:01:09/05:03:02-05:03:09/05:03:11-05:03:24/05:03:25w/05:03:26-05:03:30/05:04-05:20:02/05:22-05:25/05:26w/05:27-05:33/05:34w/05:35-05:43:02/05:44w/05:45-05:59/05:61-05:71/05:74-05:81/05:83-05:97/05:99-05:104/05:106-05:112/05:113w/05:114-05:115/05:117-05:127/05:128Nw/05:129/05:130w/05:131-05:170/05:171w/05:172-05:174/05:176-05:206N/05:208N-05:217/05:219-05:227/05:228w/05:229-05:257/05:259-05:299/05:301/05:302w/05:303-05:318, DQB1*06:325                                         | DQ5(1), -, Null | 225 bp    |

| Position |    |    |    |    |     | Mix   | Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Serology             | Size      |
|----------|----|----|----|----|-----|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------|
| G1       | G3 | G5 | G7 | G9 | G11 | Mix 2 | DQB1*03:194/03:408, DQB1*06:01:01:01-06:01:29/06:01:30?/06:01:31-06:01:34/06:02:07/06:03:01:01-06:03:06/06:03:08-06:03:18/06:03:20-06:03:49/06:08:01:01-06:08:03/06:11:02-06:12/06:14:01/06:14:03/06:17/06:21/06:26N/06:28/06:30-06:31/06:35/06:40-06:45/06:53:01-06:57:02/06:59-06:65/06:67/06:82/06:87/06:90-06:92:02/06:98-06:105/06:108/06:110/06:120/06:128/06:132-06:134/06:140-06:145:02/06:148/06:149w/06:154/06:157/06:165/06:168/06:170/06:177/06:181/06:184-06:185/06:187/06:190:01-06:191/06:194-06:196/06:199/06:203/06:205/06:209-06:210/06:214/06:218/06:221-06:223/06:229-06:230/06:233-06:234/06:238-06:239/06:243-06:246/06:248/06:250-06:251/06:253/06:257w/06:258-06:259/06:263/06:268-06:269/06:272/06:274-06:275/06:276w/06:277-06:279/06:285/06:302/06:305/06:307/06:309-06:310/06:312/06:316/06:319:01/06:321/06:323/06:327-06:331/06:334/06:336/06:340/06:345N-06:346/06:350/06:352/06:359-06:360/06:362/06:365/06:367/06:371/06:373/06:378/06:382/06:385/06:391-06:392/06:394N/06:396/06:399?/06:400/06:403/06:410/06:418-06:419/06:421/06:423N-06:425/06:427-06:428/06:433/06:435/06:440/06:443/06:450/06:453-06:455/06:459-06:460/06:462-06:463/06:464?/06:466/06:469-06:472/06:474-06:475/06:478/06:480 | -, DQ6(1), DQ1, Null | see below |
|          |    |    |    |    |     |       | DQB1*03:408, DQB1*06:01:01:01-06:01:29/06:01:30?/06:01:31-06:01:34/06:35/06:43/06:45/06:53:01-06:57:02/06:98-06:105/06:108/06:120/06:132/06:140/06:142/06:157/06:168/06:177/06:181/06:194/06:205/06:209/06:214/06:229/06:239/06:243/06:245-06:246/06:251/06:257w/06:258/06:263/06:268/06:274/06:277/06:285/06:305/06:307/06:309-06:310/06:312/06:321/06:323/06:330N/06:359/06:382/06:418-06:419/06:421/06:427/06:435/06:462-06:463/06:464?/06:466/06:469/06:471-06:472/06:475                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -, DQ6(1), Null      | 160 bp    |
|          |    |    |    |    |     |       | DQB1*03:194/06:02:07/06:03:01:01-06:03:06/06:03:08-06:03:18/06:03:20-06:03:49/06:08:01:01-06:08:03/06:11:02-06:12/06:14:01/06:14:03/06:17/06:21/06:26N/06:28/06:30-06:31/06:40-06:42/06:44/06:59-06:65/06:67/06:82/06:87/06:90-06:92:02/06:110/06:128/06:133-06:134/06:141/06:143-06:145:02/06:148/06:149w/06:154/06:165/06:170/06:184-06:185/06:187/06:190:01-06:191/06:195-06:196/06:199/06:203/06:210/06:218/06:221-06:223/06:230/06:233/06:234/06:238/06:244/06:248/06:250/06:253/06:259/06:269/06:272/06:275/06:276w/06:278-06:279/06:302/06:316/06:319:01/06:327-06:329/06:331/06:334/06:336/06:340/06:345N-06:346/06:350/06:352/06:360/06:362/06:365/06:367/06:371/06:373/06:378/06:385/06:391-06:392/06:394N/06:396/06:399?/06:400/06:403/06:410/06:423N-06:425/06:428/06:433/06:440/06:443/06:450/06:453-06:455/06:459-06:460/06:470/06:474/06:478/06:480                                                                                                                                                                                                                                                                                                                                                                   | -, DQ6(1), DQ1, Null | 170 bp    |

| Position |    |    |    |    |     | Mix   | Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Serology                 | Size      |
|----------|----|----|----|----|-----|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|-----------|
| F1       | F3 | F5 | F7 | F9 | F11 | Mix 3 | DQB1*03:08/03:23:01-03:23:02/03:137/03:217/03:228, DQB1*05:43:02, DQB1*06:02:01:01-06:03:03/<br>06:03:05w/06:03:06-06:03:07/06:03:11-06:03:13/06:03:15/06:03:17-06:03:25/06:03:27-06:03:29/<br>06:03:31-06:03:33/06:03:35-06:03:49/06:07:01/06:08:01:01-06:08:01:02/06:10-06:11:03/06:13:01-<br>06:14:02/06:15:01-06:16/06:19:01-06:20/06:23-06:24/06:26N/06:28-06:32:01/06:33/06:37/06:40-<br>06:41:01:03/06:44/06:46-06:50/06:51:02/06:60-06:63/06:65w/06:67-06:68/06:70-06:84:01:02/06:87/<br>06:90/06:92:02/06:95-06:97/06:106-06:107/06:109-06:118:01/06:118:03/06:119/06:122-06:128/06:130-<br>06:131/06:133-06:134/06:136-06:138/06:141/06:143-06:144N/06:146:01-06:148/06:150-06:152/06:154/<br>06:156/06:159/06:161-06:163/06:165-06:166/06:169-06:170/06:173-06:176/06:178-06:179N/06:182-<br>06:185/06:187-06:188/06:191-06:192/06:195/06:197-06:201/06:203/06:206:01-06:206:02/06:208:01-<br>06:208:02/06:210-06:211/06:213/06:215-06:216N/06:218-06:219/06:221-06:228/06:230/06:232-06:238/<br>06:240/06:242/06:244/06:248-06:250/06:253/06:255-06:256/06:262/06:264/06:269-06:273/06:276/<br>06:278-06:279/06:284/06:286/06:289-06:290/06:293-06:298/06:300/06:304N/06:306N/06:308N/06:311/<br>06:314-06:317N/06:319:02/06:322:01-06:322:03/06:324/06:326-06:329/06:333-06:338/06:340-06:341N/<br>06:344-06:347/06:350/06:352/06:354-06:357/06:360/06:362-06:367/06:370/06:372-06:374/06:376/<br>06:378-06:380/06:383N-06:386/06:388-06:397N/06:399-06:406/06:408-06:413/06:416:01:01Q-<br>06:416:01:02Q/06:422N-06:425/06:428/06:430-06:431/06:433/06:436-06:438/06:440/06:442-06:443/<br>06:445-06:448/06:450-06:451/06:453-06:457/06:459-06:461/06:468/06:470/06:474/06:476-06:478/<br>06:480 | - , DQ6(1),<br>DQ1, Null | see below |
|          |    |    |    |    |     |       | DQB1*03:23:01-03:23:02/03:217, DQB1*06:02:01:01-06:02:06/06:02:08-06:02:10/06:02:12-06:02:42/<br>06:02:44-06:02:60/06:03:07/06:11:01:01-06:11:01:02/06:14:02/06:15:01-06:16/06:19:01-06:20/06:24/<br>06:33/06:37/06:46-06:50/06:51:02/06:68/06:70-06:74/06:76-06:81/06:83-06:84:01:02/06:95/06:96:02-<br>06:97/06:107/06:109/06:111-06:117/06:118:03/06:122/06:124/06:127/06:131/06:137-06:138/06:146:01-<br>06:147/06:150/06:152/06:159/06:161/06:163/06:173/06:175-06:176/06:178-06:179N/06:183/06:188/<br>06:192/06:197-06:198/06:200-06:201/06:208:01-06:208:02/06:211/06:213/06:215-06:216N/06:219/<br>06:224-06:228/06:232/06:235-06:237/06:240/06:242/06:249/06:255-06:256/06:262/06:270:01-06:271/<br>06:273/06:284/06:286/06:289-06:290/06:293-06:298/06:300/06:304N/06:306N/06:308N/06:311/06:314-<br>06:315/06:317N/06:322:03/06:324/06:326/06:333/06:335/06:338/06:341N/06:344/06:347/06:354-06:357/<br>06:363-06:364/06:366/06:370/06:372/06:376/06:379N-06:380/06:384/06:386/06:388/06:390/06:395/<br>06:397N/06:401-06:402/06:404-06:406/06:409/06:411-06:413/06:416:01:01Q-06:416:01:02Q/06:422N/<br>06:430-06:431/06:436-06:438/06:442/06:445-06:448/06:451/06:457/06:461/06:468/06:476                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | - , DQ6(1),<br>DQ1, Null | 130 bp    |

| Position |  |  |  |  |  | Mix | Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Serology              | Size   |
|----------|--|--|--|--|--|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|--------|
|          |  |  |  |  |  |     | DQB1*03:08/03:137/03:228, DQB1*06:02:01:01-06:02:06/06:02:09-06:02:60/06:03:07/06:10-06:11:01:02/06:13:01-06:13:03/06:14:02/06:16/06:19:01-06:20/06:24/06:29/06:33/06:46-06:47/06:49-06:50/06:68/06:70-06:81/06:83-06:84:01:02/06:95-06:97/06:106-06:107/06:109/06:111-06:117/06:119/06:122-06:125/06:127/06:130-06:131/06:136-06:138/06:146:01-06:147/06:150/06:152/06:159/06:161/06:163/06:166/06:173/06:175-06:176/06:178-06:179N/06:182-06:183/06:188/06:192/06:197-06:198/06:200-06:201/06:206:01-06:206:02/06:208:01-06:208:02/06:211/06:213/06:215-06:216N/06:219/06:224-06:228/06:232/06:235-06:237/06:240/06:242/06:249/06:255-06:256/06:262/06:264/06:270:01-06:271/06:273/06:284/06:286/06:289-06:290/06:293-06:298/06:300/06:304N/06:306N/06:308N/06:311/06:314-06:315/06:317N/06:319:02/06:322:01-06:322:03/06:324/06:326/06:333/06:335/06:337-06:338/06:341N/06:344/06:347/06:354-06:357/06:363-06:364/06:366/06:370/06:372/06:374/06:376/06:379N-06:380/06:384/06:386/06:388/06:390/06:395/06:397N/06:401/06:404-06:406/06:408-06:409/06:411-06:413/06:416:01:01Q-06:416:01:02Q/06:422N/06:430-06:431/06:436-06:438/06:442/06:445-06:448/06:451/06:461/06:468/06:476-06:477N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | - , DQ6(1), DQ1, Null | 165 bp |
|          |  |  |  |  |  |     | DQB1*03:23:01, DQB1*05:43:02, DQB1*06:02:01:01-06:02:02/06:02:04/06:02:06-06:02:09/06:02:12-06:02:13/06:02:15/06:02:17-06:02:18/06:02:20-06:02:42/06:02:44-06:02:57/06:02:59-06:03:03/06:03:05w/06:03:06-06:03:07/06:03:11-06:03:12/06:03:15/06:03:17-06:03:25/06:03:27-06:03:29/06:03:31-06:03:32/06:03:35-06:03:38/06:03:40-06:03:49/06:07:01/06:11:01:01-06:11:03/06:14:01-06:14:02/06:15:01-06:16/06:19:02-06:20/06:23-06:24/06:26N/06:28/06:30-06:32:01/06:33/06:37/06:40-06:41:01:03/06:44/06:46-06:50/06:51:02/06:60-06:62/06:65w/06:67-06:68/06:70-06:74/06:76-06:79:01/06:80-06:84:01:02/06:87/06:90/06:92:02/06:95/06:96:02/06:107/06:109-06:113/06:115-06:118:01/06:118:03/06:122/06:124/06:126-06:128/06:131/06:133-06:134/06:137/06:141/06:143-06:144N/06:146:01-06:148/06:151/06:154/06:156/06:159/06:161-06:163/06:165/06:169/06:173-06:176/06:178-06:179N/06:183-06:185/06:187-06:188/06:191-06:192/06:195/06:197-06:201/06:203/06:210-06:211/06:213/06:216N/06:218-06:219/06:221/06:223-06:228/06:230/06:232-06:238/06:240/06:244/06:248-06:250/06:253/06:255-06:256/06:262/06:269-06:273/06:276/06:278-06:279/06:284/06:286/06:289-06:290/06:293-06:298/06:300/06:304N/06:306N/06:308N/06:311/06:314-06:317N/06:322:03/06:324/06:326-06:329/06:333-06:336/06:338/06:340-06:341N/06:344-06:347/06:350/06:352/06:354-06:357/06:360/06:362-06:367/06:370/06:372-06:373/06:376/06:378-06:380/06:383N-06:386/06:388/06:390-06:397N/06:399-06:406/06:409-06:413/06:416:01:01Q-06:416:01:02Q/06:422N-06:425/06:428/06:430-06:431/06:433/06:436-06:438/06:440/06:442-06:443/06:445-06:446/06:448/06:450-06:451/06:453-06:454N/06:456N-06:457/06:459-06:461/06:468/06:470/06:474/06:476/06:478/06:480 | - , DQ6(1), DQ1, Null | 65 bp  |

| Position |    |    |    |    |     | Mix   | Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Serology             | Size   |
|----------|----|----|----|----|-----|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|--------|
|          |    |    |    |    |     |       | DQB1*06:02:01:01-06:02:02/06:02:04/06:02:06-06:02:07/06:02:09/06:02:11-06:02:13/06:02:15/06:02:17-06:02:18/06:02:20-06:02:57/06:02:59-06:03:03/06:03:05w/06:03:06-06:03:07/06:03:11-06:03:13/06:03:15/06:03:17-06:03:25/06:03:27-06:03:29/06:03:31-06:03:33/06:03:35-06:03:49/06:08:01:01-06:08:01:02/06:10-06:11:03/06:13:01/06:14:01-06:14:02/06:16/06:19:02-06:20/06:23-06:24/06:26N/06:28-06:31/06:33/06:40-06:41:01:03/06:44/06:46-06:47/06:49-06:50/06:60-06:63/06:65w/06:67-06:68/06:70-06:79:01/06:80-06:84:01:02/06:87/06:90/06:92:02/06:95-06:96:02/06:106-06:107/06:109-06:113/06:115-06:117/06:122/06:124-06:128/06:130-06:131/06:133-06:134/06:136-06:137/06:141/06:143-06:144N/06:146:01-06:148/06:151/06:154/06:156/06:159/06:161-06:163/06:165-06:166/06:169-06:170/06:173-06:176/06:178-06:179N/06:182-06:185/06:187-06:188/06:191-06:192/06:195/06:197-06:201/06:203/06:206:01/06:210-06:211/06:213/06:216N/06:218-06:219/06:221-06:228/06:230/06:232-06:238/06:240/06:244/06:248-06:250/06:253/06:255-06:256/06:262/06:264/06:269-06:273/06:276/06:278-06:279/06:284/06:286/06:289-06:290/06:293-06:298/06:300/06:304N/06:306N/06:308N/06:311/06:314-06:317N/06:322:01/06:322:03/06:324/06:326-06:329/06:333-06:336/06:338/06:340-06:341N/06:344-06:347/06:350/06:352/06:354-06:357/06:360/06:362-06:367/06:370/06:372-06:374/06:376/06:378-06:380/06:383N-06:386/06:388-06:397N/06:399-06:401/06:403-06:406/06:408-06:413/06:416:01:01Q-06:416:01:02Q/06:422N-06:425/06:428/06:430-06:431/06:433/06:436-06:438/06:440/06:442-06:443/06:445-06:446/06:448/06:450-06:451/06:453-06:456N/06:459-06:461/06:468/06:470/06:474/06:476-06:478/06:480 | DQ6(1), -, DQ1, Null | 105 bp |
| E1       | E3 | E5 | E7 | E9 | E11 | Mix 4 | DQB1*06:04:01:01-06:07:02/06:09:01:01-06:09:03/06:09:05/06:09:06w/06:09:07-06:09:12/06:18:01-06:18:02/06:22:02/06:25/06:27:01-06:27:02/06:32:01-06:32:02/06:34/06:36/06:38-06:39/06:52/06:58/06:66/06:69:01/06:85-06:86/06:88:01:01-06:89/06:93-06:94/06:118:01-06:118:02/06:118:04/06:121w/06:129/06:135/06:142/06:155/06:158N/06:160/06:164/06:168/06:171-06:172/06:180/06:186/06:189/06:193N/06:202/06:204/06:207/06:212w/06:217/06:241/06:252N/06:254/06:261/06:265-06:267/06:280-06:283/06:287-06:288/06:291-06:292/06:299/06:303N/06:313/06:320/06:339/06:343/06:348-06:349/06:351/06:353/06:358/06:361/06:368-06:369/06:375/06:381/06:387/06:398/06:407/06:414N/06:420/06:426/06:429/06:432/06:434/06:439Q/06:444/06:449/06:452N/06:458N/06:465/06:467/06:473/06:479                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | DQ6(1), -, Null      | 170 bp |
| D1       | D3 | D5 | D7 | D9 | D11 | Mix 5 | DQB1*02:01:01:01-02:01:09/02:01:11-02:01:13/02:01:15-02:01:23/02:01:24w/02:01:25-02:24/02:26-02:34/02:36/02:37w/02:38-02:39/02:41-02:45/02:46w-02:47w/02:48-02:71/02:73-02:89:02/02:90w/02:91-02:146/02:148-02:215                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | DQ2, -, Null         | 200 bp |

| Position |    |    |    |    |     | Mix   | Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Serology                | Size      |
|----------|----|----|----|----|-----|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------|
| C1       | C3 | C5 | C7 | C9 | C11 | Mix 6 | DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:59/03:04:01:01-03:04:04/03:09-03:10:03/03:13-03:14:02/03:16/03:19:01:01-03:19:06/03:21-03:23:02/03:24/03:27-03:29/03:35/03:36w/03:42/03:44/03:46-03:60/03:69/03:71/03:73/03:75-03:77/03:80/03:82-03:84N/03:92-03:94/03:101-03:103/03:108-03:109/03:114-03:116/03:118N-03:121/03:122w/03:127-03:131/03:133-03:135/03:138-03:140/03:142-03:144/03:147/03:150/03:151w/03:152/03:154/03:157-03:160/03:162-03:167/03:169-03:170/03:171w/03:172-03:173/03:180/03:182-03:183/03:186-03:188/03:191-03:198:02/03:201-03:202/03:206-03:208/03:216-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:252-03:257/03:260/03:264/03:266-03:268/03:271/03:275-03:276N/03:281/03:284-03:286/03:288/03:290-03:294/03:297/03:302-03:303N/03:305-03:307/03:309:01-03:309:02/03:311-03:312/03:317:01-03:318/03:326-03:331/03:335/03:338N/03:340N-03:342/03:347/03:350/03:353-03:355/03:358N/03:360-03:361/03:366/03:370/03:372-03:373/03:376N-03:378/03:380-03:381/03:385N/03:387/03:389-03:391/03:394/03:396/03:399N-03:401/03:404/03:407N-03:408/03:417-03:421/03:423-03:428/03:430-03:432/03:434-03:436/03:438-03:439/03:443/03:448-03:449/03:451/03:454-03:455/03:458/03:460/03:465/03:467-03:470/03:472-03:476/03:480Q/03:482-03:483/03:485-03:486/03:488N/03:491-03:492/03:496-03:497/03:499N/03:503/03:506/03:508/03:513-03:514, DQB1*04:10, DQB1*05:03:02?, DQB1*06:35/06:53:01-06:53:02/06:475           | DQ7(3), -, Null, DQ5(1) | see below |
|          |    |    |    |    |     |       | DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:37/03:01:39-03:01:59/03:04:01:01-03:04:01:02/03:04:03-03:04:04/03:09/03:13/03:16/03:19:01:01-03:19:06/03:21-03:22:02/03:24/03:27-03:29/03:35/03:36w/03:42/03:44/03:46-03:60/03:69/03:71/03:73/03:75/03:77/03:82-03:84N/03:92-03:94/03:101-03:103/03:108-03:109/03:114-03:116/03:118N-03:120/03:122w/03:127/03:129-03:130/03:133-03:135/03:140/03:142-03:144/03:147/03:150/03:151w/03:152/03:154/03:157-03:160/03:162-03:165/03:167/03:169-03:170/03:171w/03:172-03:173/03:182/03:186-03:188/03:191-03:194/03:196-03:198:02/03:201-03:202/03:206-03:208/03:216/03:218-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:252-03:254/03:256/03:260/03:264/03:266-03:268/03:271/03:275-03:276N/03:281/03:284-03:286/03:288/03:290-03:294/03:297/03:302-03:303N/03:305-03:307/03:309:01-03:309:02/03:311-03:312/03:317:01-03:318/03:326/03:328-03:331/03:335/03:338N/03:340N-03:342/03:347/03:350/03:354N-03:355/03:358N/03:360-03:361/03:370/03:372-03:373/03:376N-03:378/03:380-03:381/03:385N/03:387/03:389-03:391/03:394/03:396/03:399N-03:401/03:404/03:407N-03:408/03:417-03:421/03:423-03:428/03:430-03:432/03:434-03:436/03:439/03:443/03:448-03:449/03:451/03:454-03:455/03:458/03:460/03:465/03:467-03:470/03:472-03:473N/03:476/03:480Q/03:482-03:483/03:485-03:486/03:488N/03:491-03:492/03:496-03:497/03:499N/03:503/03:506/03:508/03:513-03:514, DQB1*06:35/06:53:01-06:53:02/06:475 | DQ7(3), -, Null         | 100 bp    |

| Position |    |    |    |     |     | Mix     | Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Serology                | Size   |
|----------|----|----|----|-----|-----|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------|
|          |    |    |    |     |     |         | DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:59/03:04:01:01-03:04:04/03:09-03:10:03/03:13-03:14:02/03:16/03:19:01:01-03:19:06/03:21-03:22:02/03:24/03:27-03:29/03:35/03:36w/03:42/03:44/03:46-03:60/03:69/03:71/03:73/03:75-03:77/03:80/03:82-03:84N/03:92-03:94/03:101-03:103/03:108-03:109/03:114-03:116/03:118N-03:121/03:122w/03:127-03:131/03:133-03:135/03:138-03:140/03:142-03:144/03:147/03:150/03:151w/03:152/03:154/03:157-03:160/03:162-03:167/03:169-03:170/03:171w/03:172-03:173/03:180/03:182-03:183/03:186-03:188/03:191-03:198:02/03:201-03:202/03:206-03:207/03:216/03:218-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:252-03:257/03:260/03:264/03:266-03:268/03:271/03:275-03:276N/03:281/03:284-03:286/03:288/03:290-03:294/03:297/03:302-03:303N/03:305-03:307/03:309:01-03:309:02/03:311-03:312/03:317:01-03:318/03:326-03:331/03:335/03:338N/03:340N-03:342/03:347/03:350/03:353-03:355/03:358N/03:360-03:361/03:366/03:370/03:372-03:373/03:376N-03:378/03:380-03:381/03:385N/03:387/03:389-03:391/03:394/03:396/03:400N-03:401/03:404/03:407N-03:408/03:417-03:421/03:423-03:428/03:430-03:432/03:434/03:436/03:438-03:439/03:448-03:449/03:451/03:454-03:455/03:458/03:460/03:465/03:467-03:470/03:472-03:476/03:480Q/03:482-03:483/03:485-03:486/03:488N/03:491-03:492/03:496-03:497/03:499N/03:503/03:506/03:508/03:513-03:514 | DQ7(3), -, Null, DQ8(3) | 215 bp |
|          |    |    |    |     |     |         | DQB1*03:23:01-03:23:02/03:217/03:355, DQB1*04:10, DQB1*05:03:02?                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | -, DQ5(1)               | 120 bp |
| B1       | B3 | B5 | B7 | B9  | B11 | Mix 7   | DQB1*03:04:01:01-03:04:04/03:14:01-03:14:02/03:70/03:80/03:179w/03:318/03:327/03:443/03:474w, DQB1*06:246w                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | DQ7(3), -               | 175 bp |
| A1       | A3 | A5 | A7 | A9  | A11 | Mix 8   | DQB1*03:02:01:01-03:02:09/03:02:11-03:02:15/03:02:16w/03:02:17-03:02:39/03:07-03:08/03:11/03:32/03:37/03:45:01-03:45:02/03:62-03:64/03:66N-03:68/03:70/03:81/03:85/03:106-03:107/03:125/03:146/03:153/03:161/03:174-03:175/03:178-03:179/03:184-03:185/03:189-03:190/03:199/03:203-03:205/03:210-03:211/03:213N-03:215/03:220-03:221/03:223-03:224/03:225w/03:228-03:229/03:233/03:237N/03:240/03:245/03:247/03:251/03:261/03:263:01:01-03:263:01:02/03:265/03:269N/03:273-03:274/03:277-03:279/03:287/03:289/03:295-03:296/03:298-03:301/03:308/03:310N/03:315/03:320-03:324/03:333-03:334N/03:339N/03:343-03:345/03:348-03:349/03:352/03:362/03:364/03:367-03:369/03:371/03:379/03:383/03:386/03:388/03:392/03:403N/03:409-03:410/03:412-03:413/03:415-03:416/03:422N/03:429/03:433/03:437w/03:440N-03:442/03:444/03:446-03:447/03:450/03:452/03:456-03:457/03:459/03:462-03:464/03:466/03:471/03:479/03:481/03:484/03:490/03:493/03:495/03:498/03:500-03:502/03:504/03:511-03:512/03:515/03:517, DQB1*06:29/06:123/06:139/06:246/06:337                                                                                                                                                                                                                                                                                                                                 | DQ8(3), -, Null         | 130 bp |
| H2       | H4 | H6 | H8 | H10 | H12 | Mix 9 † | DQB1*03:02:01:01-03:02:01:10/03:02:01:12-03:02:03/03:02:09/03:02:12/03:02:21-03:02:24/03:02:32-03:02:33/03:02:36-03:02:37/03:02:39/03:05:01/03:05:03-03:05:04/03:08/03:11/03:37/03:68/03:211/03:229/03:245/03:247/03:250-03:251/03:263:01:01-03:263:01:02/03:289/03:415-03:416/03:422N/03:429/03:442/03:464/03:481/03:484/03:493/03:498/03:500-03:502/03:504                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | DQ8(3), -, Null         | 190 bp |

| Position |    |    |    |     |     | Mix      | Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Serology                                | Size      |
|----------|----|----|----|-----|-----|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------|
| G2       | G4 | G6 | G8 | G10 | G12 | Mix 10   | DQB1*02:77/02:180, DQB1*03:03:02:01-03:03:05/03:03:06w/03:03:07-03:03:16/03:03:17w/03:03:18-03:03:25/03:03:27-03:03:29/03:03:30?/03:06w/03:12/03:15/03:20/03:23:03/03:25:01w-03:25:02w/03:26/03:30-03:31/03:33-03:34/03:38:01-03:41/03:43/03:65/03:74/03:79/03:86-03:91Q/03:95N-03:99Q/03:104-03:105/03:111-03:113/03:117/03:123-03:124/03:126w/03:136-03:137/03:141/03:145w/03:155-03:156/03:168/03:176-03:177/03:200/03:209/03:212/03:222/03:227/03:230/03:234/03:238-03:239/03:248-03:249/03:258/03:270/03:280/03:282N-03:283/03:304/03:313/03:316/03:319/03:332/03:336-03:337/03:351/03:356N-03:357N/03:359/03:363/03:365/03:374-03:375N/03:382:01-03:382:02/03:384/03:393/03:395/03:397-03:398/03:402/03:405-03:406/03:411N/03:414/03:445/03:453/03:461/03:477-03:478/03:487/03:489/03:494/03:505/03:507/03:509N-03:510/03:516/03:518, DQB1*04:03:01w-04:03:03w, DQB1*06:02:43/06:03:10/06:03:33/06:51:01/06:66/06:96:01/06:118:04/06:168/06:172/06:322:01-06:322:02/06:377 | -, DQ9(3), DQ3, Null                    | 135 bp    |
| F2       | F4 | F6 | F8 | F10 | F12 | Mix 11 † | DQB1*03:02:01:11/03:03:02:01-03:03:04/03:03:11/03:03:30/03:25:01/03:30-03:31/03:40/03:105/03:126/03:195/03:239/03:248-03:249/03:414/03:445/03:453/03:505/03:507                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | -, DQ9(3)                               | 175 bp    |
| E2       | E4 | E6 | E8 | E10 | E12 | Mix 12   | DQB1*02:57?/02:77?/02:141?, DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:05/03:01:06w/03:01:07-03:01:52/03:01:54-03:02:22/03:02:24-03:05:05/03:07-03:22:02/03:23:02-03:24/03:25:02-03:128/03:130-03:131/03:133-03:324/03:326-03:487/03:488N?/03:489-03:512/03:513?/03:514-03:518, DQB1*05:11:01/05:131?/05:240, DQB1*06:02:02/06:03:02/06:03:34/06:04:08/06:09:07/06:29?/06:63/06:66/06:87/06:96:01?/06:96:02?/06:139/06:145:02/06:172/06:208:02/06:209?/06:320?/06:322:01-06:322:03/06:337/06:475                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | -, DQ7(3), Null, DQ8(3), DQ9(3), DQ6(1) | see below |
|          |    |    |    |     |     |          | DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:01:60/03:01:03-03:01:05/03:01:06w/03:01:07-03:01:29/03:01:31-03:01:52/03:01:54-03:02:02:02/03:02:05-03:02:12/03:02:14-03:02:22/03:02:24-03:03:02:16/03:03:04-03:04:04/03:05:03-03:05:04/03:07-03:17:01/03:18-03:19:06/03:21-03:22:02/03:23:02-03:24/03:25:02-03:36/03:38:01/03:39-03:43/03:45:01-03:53/03:55-03:60/03:62-03:71/03:74/03:76-03:98/03:101-03:111/03:113-03:117/03:119-03:128/03:130-03:131/03:133-03:135/03:137-03:155/03:157-03:161/03:163-03:174/03:176-03:180/03:182/03:184-03:203/03:205-03:222/03:224-03:225/03:227-03:232/03:234-03:236/03:239-03:249/03:251/03:253-03:261/03:263:01-01-03:268/03:270-03:290/03:292-03:324/03:326-03:335/03:337-03:345/03:347-03:350/03:353/03:355-03:370/03:372-03:373/03:375N-03:390/03:392-03:440N/03:442-03:487/03:488N?/03:489-03:512/03:513?/03:514-03:515/03:517-03:518, DQB1*05:11:01/05:240, DQB1*06:02:02/06:03:02/06:03:34/06:04:08/06:09:07/06:145:02/06:208:02   | DQ7(3), -, Null, DQ8(3), DQ9(3), DQ6(1) | 160 bp    |
|          |    |    |    |     |     |          | DQB1*02:57?/02:77?/02:141?, DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:05/03:01:06w/03:01:07-03:01:36/03:01:38-03:01:52/03:01:54-03:02:22/03:02:24-03:05:05/03:07-03:15/03:17:01-03:22:02/03:24/03:26-03:128/03:130-03:131/03:133-03:171/03:173-03:213N/03:215-03:216/03:218-03:233/03:235-03:258/03:260/03:262-03:281/03:283-03:324/03:326-03:354N/03:356N-03:449/03:451-03:487/03:488N?/03:489-03:512/03:513?/03:514-03:518, DQB1*05:131?, DQB1*06:29?/06:63/06:66/06:87/06:96:01?/06:96:02?/06:139/06:172/06:209?/06:320?/06:322:01-06:322:03/06:337/06:475                                                                                                                                                                                                                                                                                                                                                                                                               | -, DQ7(3), Null, DQ8(3), DQ9(3)         | 110 bp    |
| D2       | D4 | D6 | D8 | D10 | D12 | Mix 13   | DQB1*03:132, DQB1*04:01:01:01-04:01:05/04:01:06?/04:02:01:01/04:02:01:04-04:02:01:21/04:02:03-04:02:07/04:02:09-04:02:21/04:02:23?/04:02:24-04:03:01/04:04-04:30/04:32-04:47/04:49-04:66/04:67w/04:68N-04:90/04:91?/04:92-04:97                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | -, DQ4, Null                            | 210 bp    |

| Position |    |    |    |     |     | Mix    | Allele           | Serology | Size |
|----------|----|----|----|-----|-----|--------|------------------|----------|------|
| C2       | C4 | C6 | C8 | C10 | C12 | Mix 14 | Negative Control |          |      |

**Amplification control (internal positive control):** 440 base pairs (bp)

**Positions:** B2-A2, B4-A4, B6-A6, B8-A8, B10-A10 and B12-A12 are empty wells.

**w** = weak      **?** = nucleotide sequence information not available for the primer matching sequence or alleles with unknown reactivities

**Bold:** mixes which result in PCR fragments of different sizes (the specificities are first indicated all in one row, then split into several groups in the subsequent rows depending on the fragment size)

**Mix 6, HLA-DQB1\*03:10:** a rare allele according to Mack SJ et al., Tissue Antigens 2013, serological equivalent is controversially discussed (DQ3, DQ7 or DQ8).

† **ATTENTION!** Alleles which are not sequenced in the primer binding sites of mixes 9 and 11 (according to the IMGT/HLA Database of January 2024) have been excluded from the list of allele specificities of these mixes.

**Table 2:** Amplification patterns for all **HLA-DQB1\*** alleles detected by the HLA-DQB1\* CTS-PCR-SSP reagents (**Lot-No DQB14-1**) based on IMGT/HLA Sequence Database Release 3.55.0, January 2024

| Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Serology                | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|
| DQB1*02:01:01:01-02:01:09/02:01:11-02:01:13/02:01:15-02:01:23/02:01:25-02:24/02:26-02:34/02:36/02:38-02:39/02:41-02:45/02:48-02:56/02:58N-02:71/02:73-02:76/02:78-02:89/02:91-02:140/02:142:01:01-02:146/02:148-02:179/02:181-02:215                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | DQ2, -, Null            |   |   |   |   | 5 |   |   |   |   |    |    |    |    |
| DQB1*02:01:24/02:37/02:46-02:47/02:90                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -                       |   |   |   |   | w |   |   |   |   |    |    |    |    |
| DQB1*02:57/02:141                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -                       |   |   |   |   | 5 |   |   |   |   |    |    | ?  |    |
| DQB1*02:77                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                       |   |   |   |   | 5 |   |   |   |   | 10 |    | ?  |    |
| DQB1*02:180                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | -                       |   |   |   |   | 5 |   |   |   |   | 10 |    |    |    |
| DQB1*03:01:01:01-03:01:01:12/03:01:01:14-03:01:05/03:01:07-03:01:52/03:01:54-03:01:59/03:09-03:10/03:13/03:16/03:19:01:01-03:19:06/03:21-03:22:02/03:24/03:27-03:29/03:35/03:42/03:44/03:46-03:60/03:69/03:71/03:73/03:75-03:77/03:82-03:84N/03:92-03:94/03:101-03:103/03:108-03:109/03:114-03:116/03:118N-03:121/03:127-03:128/03:130-03:131/03:133-03:135/03:138-03:140/03:142-03:144/03:147/03:150/03:152/03:154/03:157-03:160/03:162-03:167/03:169-03:170/03:172-03:173/03:180/03:182-03:183/03:186-03:188/03:191-03:193/03:196-03:198:02/03:201-03:202/03:206-03:208/03:216/03:218-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:252-03:257/03:260/03:264/03:266-03:268/03:271/03:275-03:276N/03:281/03:284-03:286/03:288/03:290-03:294/03:297/03:302-03:303N/03:305-03:307/03:309:01-03:309:02/03:311-03:312/03:317:01-03:317:02/03:326/03:328-03:331/03:335/03:338N/03:340N-03:342/03:347/03:350/03:353-03:355/03:358N/03:360-03:361/03:366/03:370/03:372-03:373/03:376N-03:378/03:380-03:381/03:385N/03:387/03:389-03:391/03:394/03:396/03:399N-03:401/03:404/03:407N/03:417-03:421/03:423-03:428/03:430-03:432/03:434-03:436/03:438-03:439/03:448-03:449/03:451/03:454-03:455/03:458/03:460/03:465/03:467-03:470/03:472-03:473N/03:475-03:476/03:480Q/03:482-03:483/03:485-03:486/03:491-03:492/03:496-03:497/03:499N/03:503/03:506/03:508/03:514 | DQ7(3), -, Null, DQ8(3) |   |   |   |   |   | 6 |   |   |   |    |    | 12 |    |
| DQB1*03:01:06                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | -                       |   |   |   |   |   | 6 |   |   |   |    |    | w  |    |
| DQB1*03:01:53/03:129                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -                       |   |   |   |   |   | 6 |   |   |   |    |    |    |    |
| DQB1*03:02:01:01-03:02:01:10/03:02:01:12-03:02:03/03:02:09/03:02:12/03:02:21-03:02:22/03:02:24/03:02:32-03:02:33/03:02:36-03:02:37/03:02:39/03:11/03:37/03:68/03:211/03:229/03:245/03:247/03:251/03:263:01:01-03:263:01:02/03:289/03:415-03:416/03:422N/03:429/03:442/03:464/03:481/03:484/03:493/03:498/03:500-03:502/03:504                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DQ8(3), -, Null         |   |   |   |   |   |   |   | 8 | 9 |    |    | 12 |    |
| DQB1*03:02:01:11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -                       |   |   |   |   |   |   |   | 8 |   |    | 11 | 12 |    |

| Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Serology        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---|---|---|---|---|---|---|---|---|----|----|----|----|
| DQB1*03:02:04-03:02:08/03:02:11/03:02:13-03:02:15/03:02:17-03:02:20/03:02:25-03:02:31/<br>03:02:34-03:02:35/03:02:38/03:07/03:32/03:45:01-03:45:02/03:62-03:64/03:66N-03:67/03:81/03:85/<br>03:106-03:107/03:125/03:146/03:153/03:161/03:174-03:175/03:178/03:184-03:185/03:189-03:190/<br>03:199/03:203-03:205/03:210/03:213N-03:215/03:220-03:221/03:223-03:224/03:233/03:237N/<br>03:240/03:261/03:265/03:269N/03:273-03:274/03:277-03:279/03:287/03:295-03:296/03:298-03:301/<br>03:308/03:310N/03:315/03:320-03:324/03:333-03:334N/03:339N/03:343-03:345/03:348-03:349/<br>03:352/03:362/03:364/03:367-03:369/03:371/03:379/03:383/03:386/03:388/03:392/03:403N/<br>03:409-03:410/03:412-03:413/03:433/03:440N-03:441/03:444/03:446-03:447/03:450/03:452/03:456-<br>03:457/03:459/03:462-03:463/03:466/03:471/03:479/03:490/03:495/03:511-03:512/03:515/03:517,<br>DQB1*06:139 | DQ8(3), -, Null |   |   |   |   |   |   |   | 8 |   |    |    | 12 |    |
| DQB1*03:02:10/03:03:26/03:05:02/03:05:05/03:17:01-03:18/03:61/03:72/03:78/03:100/03:110/<br>03:148-03:149/03:181/03:226/03:244/03:259/03:262/03:272/03:314/03:346                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -, DQ8(3)       |   |   |   |   |   |   |   |   |   |    |    | 12 |    |
| DQB1*03:02:16/03:225/03:437                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -               |   |   |   |   |   |   |   | w |   |    |    | 12 |    |
| DQB1*03:02:23                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -               |   |   |   |   |   |   |   | 8 | 9 |    |    |    |    |
| DQB1*03:03:02:01-03:03:04/03:03:11/03:30-03:31/03:40/03:105/03:239/03:248-03:249/03:414/<br>03:445/03:453/03:505/03:507                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | DQ9(3), -       |   |   |   |   |   |   |   |   |   | 10 | 11 | 12 |    |
| DQB1*03:03:05/03:03:07-03:03:10/03:03:12-03:03:16/03:03:18-03:03:25/03:03:27-03:03:29/03:12/<br>03:15/03:20/03:23:03/03:26/03:33-03:34/03:38:01-03:39/03:41/03:43/03:65/03:74/03:79/03:86-<br>03:91Q/03:95N-03:99Q/03:104/03:111-03:113/03:117/03:123-03:124/03:136/03:141/03:155-03:156/<br>03:168/03:176-03:177/03:200/03:209/03:212/03:222/03:227/03:230/03:234/03:238/03:258/03:270/<br>03:280/03:282N-03:283/03:304/03:313/03:316/03:319/03:332/03:336-03:337/03:351/03:356N-<br>03:357N/03:359/03:363/03:365/03:374-03:375N/03:382:01-03:382:02/03:384/03:393/03:395/<br>03:397-03:398/03:402/03:405-03:406/03:411N/03:461/03:477-03:478/03:487/03:489/03:494/<br>03:509N-03:510/03:516/03:518                                                                                                                                                                                | -, Null         |   |   |   |   |   |   |   |   |   | 10 |    | 12 |    |
| DQB1*03:03:06/03:03:17/03:25:02/03:145                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -               |   |   |   |   |   |   |   |   |   | w  |    | 12 |    |
| DQB1*03:03:30                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -               |   |   |   |   |   |   |   |   |   | ?  | 11 | 12 |    |
| DQB1*03:04:01:01-03:04:04/03:14:01-03:14:02/03:80/03:318/03:327/03:443                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | DQ7(3), -       |   |   |   |   |   | 6 | 7 |   |   |    |    | 12 |    |
| DQB1*03:05:01/03:05:03-03:05:04/03:250                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | DQ8(3), -       |   |   |   |   |   |   |   |   | 9 |    |    | 12 |    |
| DQB1*03:06, DQB1*04:03:02-04:03:03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | DQ3, -          |   |   |   |   |   |   |   |   |   | w  |    |    |    |
| DQB1*03:08                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | -               |   |   | 3 |   |   |   |   | 8 | 9 |    |    | 12 |    |
| DQB1*03:23:01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -               |   |   | 3 |   |   | 6 |   |   |   |    |    |    |    |
| DQB1*03:23:02/03:217                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -               |   |   | 3 |   |   | 6 |   |   |   |    |    | 12 |    |
| DQB1*03:25:01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -               |   |   |   |   |   |   |   |   |   | w  | 11 |    |    |
| DQB1*03:36/03:122/03:151/03:171                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | -               |   |   |   |   |   | w |   |   |   |    |    | 12 |    |
| DQB1*03:70                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | -               |   |   |   |   |   |   | 7 | 8 |   |    |    | 12 |    |

| Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Serology                | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|
| DQB1*03:126                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -                       |   |   |   |   |   |   |   |   |   | w  | 11 | 12 |    |
| DQB1*03:132, DQB1*04:01:01:01-04:01:05/04:02:01:01/04:02:01:04-04:02:01:21/04:02:03-04:02:07/<br>04:02:09-04:02:21/04:02:24/04:04-04:09/04:11-04:30/04:32-04:47/04:49-04:66/04:68N-04:90/04:92-<br>04:97                                                                                                                                                                                                                                                                                                                                                                                                                                           | -, DQ4, Null            |   |   |   |   |   |   |   |   |   |    |    |    | 13 |
| DQB1*03:137, DQB1*06:322:01-06:322:02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                       |   |   | 3 |   |   |   |   |   |   | 10 |    | 12 |    |
| DQB1*03:179                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -                       |   |   |   |   |   |   | w | 8 |   |    |    | 12 |    |
| DQB1*03:194/03:408, DQB1*06:475                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -                       |   | 2 |   |   |   | 6 |   |   |   |    |    | 12 |    |
| DQB1*03:195                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -                       |   |   |   |   |   | 6 |   |   |   |    | 11 | 12 |    |
| DQB1*03:228, DQB1*06:337                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | -                       |   |   | 3 |   |   |   |   | 8 |   |    |    | 12 |    |
| DQB1*03:474                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -                       |   |   |   |   |   | 6 | w |   |   |    |    | 12 |    |
| DQB1*03:488N/03:513                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Null, -                 |   |   |   |   |   | 6 |   |   |   |    |    | ?  |    |
| DQB1*04:01:06/04:02:23/04:91                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -                       |   |   |   |   |   |   |   |   |   |    |    |    | ?  |
| DQB1*04:03:01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -                       |   |   |   |   |   |   |   |   |   | w  |    |    | 13 |
| DQB1*04:10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -                       | w |   |   |   |   | 6 |   |   |   |    |    |    | 13 |
| DQB1*04:67                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -                       |   |   |   |   |   |   |   |   |   |    |    |    | w  |
| DQB1*05:01:01:01-05:01:01:30/05:01:02-05:01:13/05:01:15/05:01:17-05:01:18/05:01:20-05:01:48/<br>05:02:01:01-05:02:27/05:03:01:01-05:03:01:09/05:03:03-05:03:09/05:03:11-05:03:24/05:03:26-<br>05:03:30/05:04-05:10/05:11:02-05:20:02/05:22-05:25/05:27-05:33/05:35-05:43:01/05:45-05:59/<br>05:61-05:71/05:74-05:81/05:83-05:97/05:99-05:104/05:106-05:112/05:114-05:115/05:117-05:127/<br>05:129/05:132Q-05:170/05:172-05:174/05:176-05:206N/05:208N-05:217/05:219-05:227/05:229-<br>05:239/05:241-05:257/05:259-05:299/05:301/05:303-05:318, DQB1*06:325                                                                                         | DQ5(1), -, Null         | 1 |   |   |   |   |   |   |   |   |    |    |    |    |
| DQB1*05:01:16/05:01:19/05:03:25/05:26/05:34/05:44/05:113/05:128N/05:130/05:171/05:228/<br>05:302                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -, Null                 | w |   |   |   |   |   |   |   |   |    |    |    |    |
| DQB1*05:03:02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | DQ5(1)                  | 1 |   |   |   |   | ? |   |   |   |    |    |    |    |
| DQB1*05:11:01/05:240                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -                       | 1 |   |   |   |   |   |   |   |   |    |    | 12 |    |
| DQB1*05:43:02, DQB1*06:23/06:156/06:162/06:169                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | -                       | 1 |   | 3 |   |   |   |   |   |   |    |    |    |    |
| DQB1*05:131                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -                       | 1 |   |   |   |   |   |   |   |   |    |    | ?  |    |
| DQB1*06:01:01:01-06:01:29/06:01:31-06:01:34/06:03:04/06:03:08-06:03:09/06:03:14/06:03:16/<br>06:03:26/06:03:30/06:08:02-06:08:03/06:11:04-06:12/06:14:03/06:17/06:21/06:42-06:43/06:45/<br>06:54N-06:57:02/06:59/06:64/06:91/06:98-06:105/06:108/06:120/06:132/06:140/06:145:01/06:157/<br>06:177/06:181/06:190:01-06:190:02/06:194/06:196/06:205/06:214/06:229/06:239/06:243/06:245/<br>06:251/06:258-06:259/06:263/06:268/06:274-06:275/06:277/06:285/06:302/06:305/06:307/06:309-<br>06:310/06:312/06:319:01/06:321/06:323/06:330N-06:331/06:359/06:371/06:382/06:418-06:419/<br>06:421/06:427/06:435/06:462-06:463/06:466/06:469/06:471-06:472 | DQ6(1), -, DQ1,<br>Null |   | 2 |   |   |   |   |   |   |   |    |    |    |    |

| Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Serology             | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|
| DQB1*06:01:30/06:464                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -                    |   | ? |   |   |   |   |   |   |   |    |    |    |    |
| DQB1*06:02:01:01-06:02:01:37/06:02:03-06:02:06/06:02:08-06:02:42/06:02:44-06:02:60/06:03:07/06:03:19/06:10-06:11:01:02/06:13:01-06:13:03/06:14:02/06:15:01-06:16/06:19:01-06:20/06:24/06:33/06:37/06:46-06:50/06:51:02/06:68/06:70-06:81/06:83-06:84:01:02/06:95/06:97/06:106-06:107/06:109/06:111-06:117/06:118:03/06:119/06:122/06:124-06:127/06:130-06:131/06:136-06:138/06:146:01-06:147/06:150-06:152/06:159/06:161/06:163/06:166/06:173-06:176/06:178-06:179N/06:182-06:183/06:188/06:192/06:197-06:198/06:200-06:201/06:206:01-06:206:02/06:208:01/06:211/06:213/06:215-06:216N/06:219/06:224-06:228/06:232/06:235-06:237/06:240/06:242/06:249/06:255-06:256/06:262/06:264/06:270:01-06:271/06:273/06:284/06:286/06:289-06:290/06:293-06:298/06:300/06:304N/06:306N/06:308N/06:311/06:314-06:315/06:317N/06:319:02/06:324/06:326/06:333/06:335/06:338/06:341N/06:344/06:347/06:354-06:357/06:363-06:364/06:366/06:370/06:372/06:374/06:376/06:379N-06:380/06:383N-06:384/06:386/06:388-06:390/06:393/06:395/06:397N/06:401-06:402/06:404-06:406/06:408-06:409/06:411-06:413/06:416:01:01Q-06:416:01:02Q/06:422N/06:430-06:431/06:436-06:438/06:442/06:445-06:448/06:451/06:456N-06:457/06:461/06:468/06:476-06:477N | DQ6(1), -, DQ1, Null |   |   | 3 |   |   |   |   |   |   |    |    |    |    |
| DQB1*06:02:02/06:208:02/06:322:03                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | DQ6(1), -            |   |   | 3 |   |   |   |   |   |   |    |    | 12 |    |
| DQB1*06:02:07/06:03:01:01-06:03:01:21/06:03:03/06:03:06/06:03:11-06:03:13/06:03:15/06:03:17-06:03:18/06:03:20-06:03:25/06:03:27-06:03:29/06:03:31-06:03:32/06:03:35-06:03:49/06:08:01:01-06:08:01:02/06:11:02-06:11:03/06:14:01/06:26N/06:28/06:30-06:31/06:40-06:41:01:03/06:44/06:60-06:62/06:67/06:82/06:90/06:92:02/06:110/06:128/06:133-06:134/06:141/06:143-06:144N/06:148/06:154/06:165/06:170/06:184-06:185/06:187/06:191/06:195/06:199/06:203/06:210/06:218/06:221-06:223/06:230/06:233-06:234/06:238/06:244/06:248/06:250/06:253/06:269/06:272/06:278-06:279/06:316/06:327-06:329/06:334/06:336/06:340/06:345N-06:346/06:350/06:352/06:360/06:362/06:365/06:367/06:373/06:378/06:385/06:391-06:392/06:394N/06:396/06:400/06:403/06:410/06:423N-06:425/06:428/06:433/06:440/06:443/06:450/06:453-06:455/06:459-06:460/06:470/06:474/06:478/06:480                                                                                                                                                                                                                                                                                                                                                                 | -, DQ6(1), DQ1, Null |   | 2 | 3 |   |   |   |   |   |   |    |    |    |    |
| DQB1*06:02:43                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                    |   |   | 3 |   |   |   |   |   |   | 10 |    |    |    |
| DQB1*06:03:02/06:63/06:87                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | DQ6(1), -            |   | 2 | 3 |   |   |   |   |   |   |    |    | 12 |    |
| DQB1*06:03:05/06:65                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | -                    |   | 2 | w |   |   |   |   |   |   |    |    |    |    |
| DQB1*06:03:10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                    |   | 2 |   |   |   |   |   |   |   | 10 |    |    |    |
| DQB1*06:03:33                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -                    |   | 2 | 3 |   |   |   |   |   |   | 10 |    |    |    |
| DQB1*06:03:34/06:145:02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | -                    |   | 2 |   |   |   |   |   |   |   |    |    | 12 |    |

| Allele                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Serology        | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---|---|---|---|---|---|---|---|---|----|----|----|----|
| DQB1*06:04:01:01-06:04:07/06:04:09-06:06/06:07:02/06:09:01:01-06:09:03/06:09:05/06:09:08-06:09:12/06:18:01-06:18:02/06:22:02/06:25/06:27:01-06:27:02/06:32:02/06:34/06:36/06:38-06:39/06:52/06:58/06:69:01/06:85-06:86/06:88:01:01-06:89/06:93-06:94/06:118:02/06:129/06:135/06:155/06:158N/06:160/06:164/06:171/06:180/06:186/06:189/06:193N/06:202/06:204/06:207/06:217/06:241/06:252N/06:254/06:261/06:265-06:267/06:280-06:283/06:287-06:288/06:291-06:292/06:299/06:303N/06:313/06:339/06:343/06:348-06:349/06:351/06:353/06:358/06:361/06:368-06:369/06:375/06:381/06:387/06:398/06:407/06:414N/06:420/06:426/06:429/06:432/06:434/06:439Q/06:444/06:449/06:452N/06:458N/06:465/06:467/06:473/06:479 | DQ6(1), -, Null |   |   |   | 4 |   |   |   |   |   |    |    |    |    |
| DQB1*06:04:08/06:09:07                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | -               |   |   |   | 4 |   |   |   |   |   |    |    | 12 |    |
| DQB1*06:07:01/06:32:01/06:118:01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | -               |   |   | 3 | 4 |   |   |   |   |   |    |    |    |    |
| DQB1*06:09:06/06:121/06:212                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -               |   |   |   | w |   |   |   |   |   |    |    |    |    |
| DQB1*06:29                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -               |   |   | 3 |   |   |   |   | 8 |   |    |    | ?  |    |
| DQB1*06:35/06:53:01-06:53:02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -               |   | 2 |   |   |   | 6 |   |   |   |    |    |    |    |
| DQB1*06:51:01/06:377                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -               |   |   |   |   |   |   |   |   |   | 10 |    |    |    |
| DQB1*06:66/06:172                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | -               |   |   |   | 4 |   |   |   |   |   | 10 |    | 12 |    |
| DQB1*06:96:01                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -               |   |   | 3 |   |   |   |   |   |   | 10 |    | ?  |    |
| DQB1*06:96:02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | -               |   |   | 3 |   |   |   |   |   |   |    |    | ?  |    |
| DQB1*06:118:04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | -               |   |   |   | 4 |   |   |   |   |   | 10 |    |    |    |
| DQB1*06:123                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -               |   |   | 3 |   |   |   |   | 8 |   |    |    |    |    |
| DQB1*06:142                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -               |   | 2 |   | 4 |   |   |   |   |   |    |    |    |    |
| DQB1*06:149/06:257                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -               |   | w |   |   |   |   |   |   |   |    |    |    |    |
| DQB1*06:168                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -               |   | 2 |   | 4 |   |   |   |   |   | 10 |    |    |    |
| DQB1*06:209                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -               |   | 2 |   |   |   |   |   |   |   |    |    | ?  |    |
| DQB1*06:246                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -               |   | 2 |   |   |   |   | w | 8 |   |    |    |    |    |
| DQB1*06:276                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -               |   | w | 3 |   |   |   |   |   |   |    |    |    |    |
| DQB1*06:320                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -               |   |   |   | 4 |   |   |   |   |   |    |    | ?  |    |
| DQB1*06:399                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | -               |   | ? | 3 |   |   |   |   |   |   |    |    |    |    |

w = weak

? = nucleotide sequence information not available for the primer matching sequence or alleles with unknown reactivities

**ATTENTION!** Alleles which are not sequenced in the primer binding sites of mixes 9 and 11 (according to the IMGT/HLA Database of January 2024) have been excluded from the list of allele specificities of these mixes.

## 14. Certificate of Analysis



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**CTS** Collaborative Transplant Study

# Certificate of Analysis

## HLA-DQB1\* CTS-PCR-SSP Tray Kit

|                                              |         |
|----------------------------------------------|---------|
| Product number                               | 119     |
| Lot number                                   | DQB14-1 |
| Number of HLA-specific primer mixes per test | 13      |

### Mix specifications

The specificity of each primer pair has been tested against a panel of well characterized DNAs.

### Result

No false positive or false negative amplifications were obtained under our test conditions of the bulk reagents.

|                  |                                              |
|------------------|----------------------------------------------|
| Date of approval | 12.06.2024                                   |
| Approved by      | H. Tran, M.D.<br>Quality Control, Supervisor |