

Manual No.	22
Revision	August 02, 2018
Product No.	122
Lot No.	DR42-2 DQB12-0

## WORKING INSTRUCTION

### HLA- DRB1\* /-DQB1\* CTS-PCR-SSP TRAY KIT

#### LOCUS- AND LOT-SPECIFIC MANUAL

To be applied to the following product:

Product No.	Description
122	HLA-DRB1* /-DQB1* CTS-PCR-SSP TRAY KIT 

#### 1. Main differences

- Between Lot DR42-2 (the current lot) and Lot DR42-1:**  
 The kit was updated to cover new alleles included in the IMGT/HLA Sequence Database of January 2018. Deleted and renamed alleles were taken into consideration.
- Between Lot DQB12-0 (the current lot) and Lot DQB11-2:**  
 The number of mixes increased from 13 to 14 (incl. negative control).  
 Mix 9 detects DQB1\*03:05 (serology DQ8) in addition to DQB1\*03:02 (serology DQ8).  
 A completely new mix (amplifying DQB1\*03:03 / DQ9) was inserted at position 11.  
 Alleles which are not sequenced in the primer binding sites of mixes 9 and 11 (according to the IMGT/HLA Database of January 2018) have been excluded from the list of allele specificities of these mixes.  
 The kit was updated to cover new alleles included in the IMGT/HLA Database of January 2018. Deleted and renamed alleles were taken into consideration.

#### 2. Introduction

- Intended use: This kit reveals a low/intermediate resolution typing of HLA-DRB1\* (besides HLA-DRB3\*/4\*/5\* low resolution) and -DQB1\* by the PCR-SSP method.
- Allele coverage: IMGT/HLA Sequence Database Release 3.31.0, January 2018 for HLA-DRB1\* and -DQB1\*, except:
  - HLA-DRB1\***01:02:12/01:18:01-01:18:02/01:22/01:33N/01:44:01-01:44:02/01:60/01:76, DRB1\*04:11:04/04:156, DRB1\*08:01:06/08:57/08:80, DRB1\*09:09/09:23, DRB1\*10:12, DRB1\*11:02:03/11:04:13/11:86/11:94/11:110/11:123/11:156/11:167/11:172/11:185/11:187/11:192/11:208, DRB1\*12:31N/12:42/12:57, DRB1\*13:195, DRB1\*15:01:22/15:34/15:115N, DRB3\*02:26-02:27/02:47/02:58/02:66.
  - HLA-DQB1\***02:25/02:35/02:40/02:72, DQB1\*03:05:02/03:17:02/03:61/03:72/03:100/03:181/03:226/03:262, DQB1\*04:02:02/04:02:08/04:31, DQB1\*05:01:14/05:03:10/05:21/05:60/05:72/05:73/05:82/05:98/05:105/05:116 and DQB1\*06:02:08/06:03:19/06:09:04/06:15:01-06:15:02/06:22:01/06:22:03/06:37/06:48/06:51:02/06:69:02/06:118:03/06:153/06:167/06:231/06:247.

These alleles are considered to be rare.

- This manual is only valid for **Lot No. DR42-2 DQB12-0**.
- 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).

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#### 4. Kit Composition

- Number of PCR primer mixes per test: 38, of which:
  - 24 mixes for HLA-DRB1 typing (23 allele-specific mixes + 1 negative control mix)
  - 14 mixes for HLA-DQB1 typing (13 allele-specific mixes + 1 negative control mix)
  - Please note: Wells (positions on tray) B5 - A5, H6 - A6, B11 - A11 and H12 - A12 are empty
- Number of tests per tray: 2
- Number of trays per kit: 10
- The primer mixes are aliquoted and dried in thin-walled, colorless 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 Tables (Appendix / Table 1 and 2) to confirm the correct product size.
- Use the Amplification Pattern Tables (Appendix / Table 3 and 4) to make the allele assignments or use the SCORE Software ([www.IHWG.org](http://www.IHWG.org)) for detailed result interpretation.

#### 8. Interpretation Hints

- The quality and quantity of DNA as well as of the Taq polymerase are extremely crucial factors. If your bands are too weak, you might try to adjust these two factors until you obtain optimal results.
- Please also refer to Section 7 of the 'Working instruction for the CTS-PCR-SSP TRAY and MINITRAY KITS' (Manual No. 100A) supplied along with this product.

#### 9. Special notes

- **HLA-DRB1\* locus:**  
Mix 6 and mix 7 detect (among other alleles) the most common HLA-DRB1\*03 alleles which correspond either to serological split HLA-DR17 or HLA-DR18, respectively.
- **HLA-DQB1\* locus:**  
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.

#### 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 me or my coworkers at:

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E-mail: [hien.tran@med.uni-heidelberg.de](mailto:hien.tran@med.uni-heidelberg.de)

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13. Appendix

Table 1: Sizes of the PCR products and allele specificities of each HLA-DRB1\* CTS-PCR-SSP primer mix (Lot No. DR42-2) based on IMG/HLA Sequence Database Release 3.31.0, January 2018

Position	Mix	Allele	Serology	Size
H1	H7	DRB1*01:01:01:01:02:11/01:02:13:01:17/01:19:01:21/01:23:01:32/01:34:01:38/01:39Nw/01:41:01:43/01:45:01:48/01:49w/01:50:01:59/01:61:01:64/01:65:01w/01:65:02w/01:66:01:75/01:77-01:84	DR1, -, DR103, Null	140 bp
G1	G7	DRB1*01:03:01:01:03:02/01:39Nw/01:42/01:61	DR103, -, Null	200 bp
F1	F7	<b>DRB1*15:01:01:01:15:01:21/15:01:23-15:33/15:35-15:112/15:113Nw/15:114/15:116-15:147, DRB1*16:09:01-16:10/16:33/16:36-16:37</b> DRB1*15:01:01:01:15:01:21/15:01:23-15:01:28/15:01:30-15:02:09/15:02:11-15:02:17/15:03:01:01-15:05/15:08/15:10/15:12-15:33/15:35-15:46/15:49-15:58/15:60-15:64/15:66:01-15:67/15:69-15:72/15:74-15:76/15:78-15:87/15:89-15:93/15:95/15:98-15:106/15:108-15:112/15:113Nw/15:114/15:116-15:124/15:126-15:129N/15:131-15:135/15:137N-15:142/15:144-15:147, DRB1*16:09:01-16:10/16:33/16:36-16:37	DR15(2), -, DR2, Null, DR16(2) DR15(2), -, DR2, Null, DR16(2)	see below 140 bp
E1	E7	DRB1*15:01:01:01:15:01:06/15:01:13/15:01:15-15:01:21/15:01:24-15:09/15:11-15:20/15:22-15:24/15:26/15:28-15:33/15:35-15:43/15:45/15:47-15:49/15:51-15:53/15:55-15:65/15:67-15:79/15:81-15:83/15:85-15:90/15:92-15:99/15:101-15:102/15:104:01-15:112/15:113Nw/15:114/15:116/15:118/15:121/15:123-15:126/15:128/15:130-15:147	DR15(2), -, DR2, Null	215 bp
D1	D7	DRB1*15:21, DRB1*16:01:01:16:01:08/16:01:10-16:05:02/16:07-16:47	-, DR16(2), DR2, Null	210 bp
C1	C7	DRB1*03:01:01:01:03:01:02w/03:01:03/03:01:05-03:01:13/03:01:14w/03:01:15-03:02:01/03:02:02w/03:02:03-03:05:02/03:05:03w/03:06-03:08/03:09?/03:10-03:11:01/03:12?/03:13:01/03:13:02w/03:14-03:15:01/03:15:02w/03:16-03:41:02/03:43-03:75/03:77-03:83/03:85-03:86/03:88-03:91/03:93-03:96/03:98-03:110/03:112-03:124/03:127w/03:128-03:129/03:130w/03:131-03:134/03:135w/03:136-03:142, DRB1*11:07:01/11:07:02w/11:53/11:103:01-11:103:02/11:105/11:107/11:125/11:136/11:173, DRB1*14:104w/14:111w/14:171, DRB3*01:14w	DR17(3), -, DR18(3), DR3, Null, DR11(5)	225 bp
B1	B7	DRB1*03:01:01:01:03:01:26/03:04:01:03:04:02/03:06/03:08/03:10-03:11:01/03:12?/03:13:01-03:13:02/03:15:01-03:16/03:18-03:20/03:22-03:23/03:25-03:26/03:28/03:30-03:34/03:36-03:37/03:39/03:42-03:48/03:50-03:52/03:54w/03:55-03:56/03:58-03:62/03:64-03:73/03:75-03:80/03:82-03:87/03:89/03:91-03:96/03:98-03:99/03:100:01w-03:100:02w/03:104/03:106-03:112/03:114/03:116-03:118/03:121/03:123-03:129/03:132-03:142, DRB1*09:06, DRB1*11:59/11:83/11:135/11:182, DRB1*13:27/13:71/13:129/13:144/13:176, DRB1*14:82/14:95/14:132, DRB3*01:34	DR17(3), -, DR3, Null, DR13(6)	220 bp
		DRB1*03:02:01-03:02:03/03:05:01-03:05:03/03:09/03:14/03:27/03:29/03:38/03:53/03:74/03:81/03:88/03:90/03:102-03:103/03:115/03:122/03:130-03:131, DRB1*11:09/11:20/11:28:02/11:87/11:122, DRB1*13:02:01:01-13:02:03/13:02:05-13:02:13/13:05:01-13:05:03/13:26:01-13:26:02/13:29/13:31/13:34/13:36/13:39/13:41/13:50:02-13:50:03/13:56/13:63/13:65/13:67/13:73-13:74/13:85/13:96:01-13:96:02/13:99/13:103-13:104/13:109/13:119-13:120/13:123-13:124/13:126/13:128/13:136/13:139-13:140/13:142N-13:143/13:145/13:147/13:155/13:157-13:159/13:165/13:168/13:170-13:171:02/13:179/13:189/13:196/13:198-13:199/13:202-13:203/13:207-13:212/13:220/13:225/13:235-13:237/13:239-13:241/13:243-13:244, DRB1*14:02:01:14:03:02/14:09/14:13/14:19?/14:24/14:27:01-14:27:02/14:30/14:46-14:48/14:51/14:63/14:67/14:85/14:89/14:98/14:109/14:115/14:134-14:135/14:144/14:174/14:179, DRB1*16:08, DRB3*01:08/01:46, DRB3*02:06?/02:20	DR18(3), -, DR3, DR11(5), DR13(6), Null, DR14(6), DR1403	190 bp

Position	Mix	Allele	Serology	Size
A1	A7	DRB1*03:49, DRB1*04:01:01:04:05:11/04:05:13-04:11:03/04:12-04:155/04:157N-04:237, DRB1*08:38, DRB1*11:22/11:102:01-11:102:02/11:175, DRB1*14:10/14:57/14:143/14:161/14:182	- , DR4, Null, DR14(6)	see below
		DRB1*04:28/04:35/04:42-04:43/04:59/04:147/04:199/04:210/04:230, DRB1*11:22	DR4, -	145 bp
		DRB1*04:01:01:04:01:06/04:01:08-04:01:10/04:01:12-04:05:04/04:05:06-04:05:11/04:05:13-04:11:03/04:12-04:27/04:29-04:34/04:36-04:41/04:44:01-04:48/04:50-04:58/04:60-04:63/04:65/04:67-04:84/04:86-04:146/04:148-04:155/04:157N-04:161/04:163-04:173/04:175-04:191/04:193-04:195/04:197-04:198/04:200-04:209/04:211-04:212N/04:214N-04:219/04:221-04:226/04:228/04:231-04:237, DRB1*14:10/14:57/14:143/14:182	DR4, -, Null, DR14(6)	145 bp
		DRB1*04:01:01:04:01:07/04:01:09-04:01:17/04:05:01:01-04:05:11/04:05:13-04:05:18/04:07:01:01-04:09/04:14/04:16-04:17:02/04:19-04:21/04:24/04:26/04:28-04:31/04:33-04:35/04:38/04:43/04:45/04:47-04:48/04:54/04:57/04:61-04:63/04:69/04:72:01-04:72:02/04:74-04:77/04:80-04:84/04:86-04:87/04:89-04:90/04:92/04:98:01-04:98:02/04:102-04:107/04:111-04:113/04:115-04:117/04:119N/04:123/04:125/04:127-04:132/04:135/04:137/04:139-04:141/04:145/04:152-04:153/04:155/04:158N-04:160/04:162/04:166/04:170-04:175/04:178N-04:179/04:184-04:185/04:187-04:190/04:194/04:196-04:197/04:199-04:200/04:202/04:205-04:206/04:208-04:209/04:212N/04:214N/04:216-04:217/04:222/04:225/04:227/04:231-04:233/04:236, DRB1*11:22, DRB1*14:143	DR4, -, Null	260 bp
		DRB1*03:49, DRB1*04:28/04:35/04:42-04:43/04:59/04:147/04:199/04:210/04:230, DRB1*11:102:01-11:102:02/11:175	- , DR4	85 bp
		DRB1*04:01:01:04:01:06/04:01:08-04:01:10/04:01:12-04:02:03/04:02:05-04:05:04/04:05:06-04:05:11/04:05:13-04:05:16/04:05:18-04:11:03/04:12-04:27/04:29-04:34/04:36-04:41/04:44:01-04:48/04:50-04:58/04:60-04:63/04:65/04:67-04:84/04:86-04:146/04:148-04:155/04:157N-04:160/04:163-04:173/04:175-04:191/04:193-04:195/04:197-04:198/04:200-04:209/04:211-04:212N/04:214N-04:219/04:221-04:226/04:228-04:229/04:231-04:237, DRB1*08:38, DRB1*14:161	DR4, -, Null	85 bp
		DRB1*04:01:01:04:01:07/04:01:09-04:01:17/04:05:01:01-04:05:11/04:05:13-04:05:16/04:07:01:01-04:09/04:14/04:16-04:17:02/04:19-04:21/04:24/04:26/04:28-04:31/04:33-04:35/04:38/04:43/04:45/04:47-04:48/04:54/04:57/04:61-04:63/04:69/04:72:01-04:72:02/04:74-04:77/04:80-04:84/04:86-04:87/04:89-04:90/04:92/04:98:01-04:98:02/04:102-04:107/04:111-04:113/04:115-04:117/04:119N/04:123/04:125/04:127-04:132/04:135/04:137/04:139-04:141/04:145/04:152-04:153/04:155/04:158N-04:160/04:162/04:166/04:170-04:175/04:178N-04:179/04:184-04:185/04:187-04:190/04:194/04:196-04:197/04:199-04:200/04:202/04:205-04:206/04:208-04:209/04:212N/04:214N/04:216-04:217/04:222/04:225/04:227/04:231-04:233/04:236, DRB1*11:22, DRB1*14:143	DR4, -, Null	200 bp
		DRB1*01:21w, DRB1*07:01:01-01-07:01:22/07:03-07:84	- , DR7, Null	see below
		DRB1*07:01:01-01-07:01:06/07:01:09-07:01:11/07:01:13-07:01:14/07:01:16-07:01:18/07:01:21-07:01:22/07:03-07:05/07:08-07:11/07:14-07:27/07:29-07:44/07:46-07:56/07:58N-07:82/07:84	DR7, -, Null	115 bp
		DRB1*01:21w, DRB1*07:01:01-01-07:01:03/07:01:05-07:01:13/07:01:15-07:01:22/07:03/07:05-07:10N/07:12-07:24/07:26N-07:31/07:33-07:34/07:36-07:58N/07:60/07:62-07:84	- , DR7, Null	190 bp

Position	Mix	Allele	Serology	Size
		<b>DRB1*08:01:01-08:01:02/08:01:04-08:01:05/08:02:01-01-08:04:01/08:04:03-08:19/08:21-08:30:03/08:32-08:56/08:58-08:66/08:68:01-08:79/08:81-08:82, DRB1*11:67/11:193:01-11:193:02, DRB1*12:16:01-12:16:03/12:22/12:39/12:46, DRB1*14:04:01-14:04:03/14:15/14:28/14:31/14:50/14:68:01-14:68:02/14:71/14:73/14:76/14:79/14:93/14:107/14:120/14:138/14:145/14:148/14:152N/14:180</b>	DR8, -, Null, DR1404, DR14(6)	see below
G2	Mix 10	DRB1*08:01:01-08:01:02/08:01:04-08:01:05/08:03:02-01-08:03:07/08:05-08:06/08:10/08:12/08:14/08:16-08:18/08:22-08:23/08:26-08:27/08:29/08:32-08:33/08:35-08:40/08:43/08:46/08:48/08:50/08:53-08:56/08:58/08:60N/08:62/08:64-08:66/08:68:01-08:68:02/08:70-08:71/08:74/08:76-08:79, DRB1*12:46	DR8, -, Null	165 bp
		<b>DRB1*08:08, DRB1*14:04:01-14:04:03/14:28/14:31/14:50/14:68:01-14:68:02/14:71/14:73/14:76/14:79/14:93/14:107/14:120/14:138/14:145/14:148/14:152N/14:180</b>	-, DR1404, DR14(6), Null	165 bp
		DRB1*08:01:01-08:01:02/08:01:04-08:01:05/08:02:01-01-08:03:06/08:04:01/08:04:03-08:04:07/08:06-08:17/08:19/08:21-08:23/08:26-08:28/08:30:01-08:30:03/08:32-08:39/08:42/08:44-08:46/08:48-08:55/08:58-08:66/08:68:01-08:79/08:81-08:82, DRB1*11:67, DRB1*14:15	DR8, -, Null	215 bp
		<b>DRB1*08:01:01-08:01:02/08:01:04-08:01:05/08:02:01-01-08:02:02-08:03:07/08:05/08:07-08:09/08:11/08:13-08:19/08:21/08:23-08:27/08:29-08:30:02/08:32-08:38/08:40-08:47/08:49/08:51/08:53/08:56/08:58/08:60N-08:63/08:66/08:68:01-08:69/08:71-08:74/08:76-08:79, DRB1*11:193:01-11:193:02, DRB1*12:16:01-12:16:03/12:22/12:39, DRB1*14:68:01-14:68:02/14:93</b>	DR8, -, Null	250 bp
F2	Mix 11	DRB1*09:01:02:01-09:05/09:07-09:08/09:10-09:22/09:24-09:32	DR9, -	220 bp
E2	Mix 12	DRB1*01:34w, DRB1*10:01:01-10:11/10:13-10:24	-, DR10	205 bp
		<b>DRB1*01:75, DRB1*03:08/03:65/03:140, DRB1*04:15/04:61/04:138/04:145/04:154/04:170, DRB1*08:31/08:41/08:63/08:75, DRB1*10:23, DRB1*11:01:01-11:02:02/11:02:04-11:04:12/11:04:14-11:11:01/11:11:03-11:21/11:22?/11:23:01-11:25/11:26?/11:27:01-11:39/11:40?/11:41-11:70/11:72-11:85/11:87-11:93/11:95-11:109/11:111-11:122/11:124-11:155/11:157-11:166/11:168-11:171/11:173-11:184/11:186/11:188-11:191/11:193:01-11:202/11:203w/11:204-11:207/11:209-11:210/11:211w/11:212-11:220, DRB1*12:04/12:49, DRB1*14:11, DRB1*15:99/15:109, DRB1*16:16/16:27, DRB3*01:42, DRB3*02:18, DRB5*01:13</b>	-, DR4, DR11(5), DR11(5)/DR13 (6), Null, DR14(6)	125 bp
		<b>DRB1*08:25/08:32/08:47/08:53, DRB1*12:01:01-12:01:04/12:01:05w/12:01:06-12:19/12:20w/12:21-12:30/12:32-12:41/12:43-12:68</b>	-, DR12(5), Null	see below
C2	Mix 14	DRB1*12:01:01-12:01:03/12:01:05w/12:01:06-12:02:06/12:03:02-12:13/12:15-12:19/12:20w/12:21-12:28/12:30/12:32-12:35/12:37/12:39-12:41/12:43-12:44/12:46-12:50/12:53-12:55/12:59-12:62/12:64-12:68	-, DR12(5), Null	105 bp
		<b>DRB1*08:25/08:47, DRB1*12:01:01-12:01:05/12:01:03-12:01:04/12:01:05w/12:01:06-12:02:03/12:02:05-12:15/12:16:02-12:19/12:20w/12:21/12:23-12:30/12:32-12:41/12:43-12:48/12:50-12:56/12:58-12:65/12:67-12:68</b>	-, DR12(5), Null	210 bp
		<b>DRB1*03:125, DRB1*11:09/11:16/11:20/11:28:02/11:40w/11:58:01/11:59w/11:83/11:87/11:113/11:115/11:122w/11:182, DRB1*13:01:01-13:02:13/13:05:01-13:06/13:10/13:15-13:16/13:18/13:26:01-13:28/13:31-13:32/13:34-13:36/13:39-13:42/13:50:02-13:51/13:53/13:59/13:61:01-13:61:02/13:63w/13:65/13:67/13:69/13:73-13:74/13:79-13:80/13:85/13:87/13:91-13:93/13:96:01-13:96:02/13:98-13:99/13:102-13:105/13:109-13:110/13:111w/13:112-13:113N/13:117/13:120-13:121/13:123-13:128/13:130-13:131/13:136-13:148/13:153/13:155-13:160/13:165-13:166/13:168/13:170-13:171:02/13:173/13:176-13:177/13:179/13:183-13:187/13:189-13:191/13:198-13:203/13:205/13:207-13:215/13:217-13:218/13:220-13:222/13:223w/13:225-13:226/13:233/13:234w/13:236-13:245, DRB1*14:27:01-14:27:02/14:63/14:67/14:78, DRB1*16:08</b>	-, DR11(5), DR11(5)/DR13 (6), DR13(6), Null, DR14(6)	130 bp

Position	Mix	Allele	Serology	Size
		DRB1*03:12?, DRB1*11:03:01-11:03:02/11:11:01/11:11:03/11:36/11:40-11:41/11:55/11:59/11:63:01-11:63:02/11:68/11:76/11:85/11:122/11:138-11:139/11:151/11:161/11:168/11:176/11:213, DRB1*13:03:01-13:04/13:12:01-13:13/13:20-13:21:02/13:24/13:29/13:307/13:32-13:33:03/13:38/13:43/13:48-13:49/13:54/13:55?/13:58/13:63/13:65-13:66:02/13:71/13:75/13:78/13:81/13:88-13:90/13:93-13:95/13:101/13:108/13:111/13:115/13:118/13:120/13:122/13:133-13:134/13:139/13:149/13:151-13:152/13:154/13:161/13:164/13:167/13:169/13:174/13:188/13:194/13:216/13:219/13:227-13:228/13:230/13:247, DRB1*14:13/14:63/14:65/14:78/14:85/14:169-14:170	DR3, DR11(5), -, DR13(6), DR14(6)	see below
A2	Mix 16	DRB1*03:12?, DRB1*13:03:01-13:04/13:12:01-13:13/13:21:01-13:21:02/13:30?/13:32-13:33:03/13:38/13:48-13:49/13:55?/13:58/13:65-13:66:02/13:75/13:81/13:88-13:90/13:93-13:95/13:101/13:108/13:115/13:118/13:120/13:122/13:133-13:134/13:139/13:151-13:152/13:154/13:161/13:164/13:167/13:169/13:174/13:188/13:194/13:216/13:219/13:227-13:228/13:230, DRB1*14:13/14:63/14:65/14:78/14:85/14:169-14:170	DR3, DR13(6), -, DR14(6)	170 bp
		DRB1*03:12?, DRB1*11:03:01-11:03:02/11:11:01/11:11:03/11:36/11:40-11:41/11:55/11:59/11:63:01-11:63:02/11:68/11:76/11:85/11:122/11:138-11:139/11:151/11:161/11:168/11:176/11:213, DRB1*13:20-13:21:02/13:24/13:29/13:43/13:49/13:54/13:55?/13:63/13:71/13:75/13:78/13:81/13:85/14:85/14:169-14:170	DR3, DR11(5), -, DR13(6), DR14(6)	200 bp
H3	Mix 17	DRB1*11:09/11:28:02/11:40w/11:58:01/11:83/11:87/11:113/11:115/11:122w/11:182, DRB1*13:05:01-13:05:03/13:18/13:26:01-13:26:02/13:42/13:50:02-13:50:03/13:63w/13:111w/13:136/13:144/13:158/13:189/13:199/13:203, DRB1*14:27:01-14:27:02, DRB1*16:08	DR11(5), -, DR13(6), DR14(6)	130 bp



Position	Mix	Allele	Serology	Size
G3	G9	DRB1*03:01:01:01:06/03:01:07w/03:01:08-03:01:13/03:01:14w/03:01:15-03:07/03:09?/03:10-03:11:01/03:12?/03:13:01-03:37/03:38w/03:39-03:41:02/03:43-03:45/03:46w/03:47-03:58/03:59w/03:60-03:64/03:66-03:78/03:79w/03:80-03:86/03:88-03:110/03:112-03:126/03:127w/03:128-03:129/03:130w/03:131-03:134/03:135w/03:136-03:139/03:141-03:142, DRB1*08:01:01:08:01:02/08:01:04-08:01:05/08:02:01:01-08:04:01/08:04:03-08:24:02/08:25w/08:26-08:30/03:08:32-08:33/08:34w/08:35-08:40/08:42-08:46/08:47w/08:48-08:51/08:52w/08:53-08:56/08:58-08:62/08:64-08:68:02/08:70-08:74/08:76-08:79/08:81-08:82, DRB1*12:01:01:01w-12:01:07w/12:01:09w-12:02:05w/12:02:07w-12:03:03w/12:05w-12:08w/12:09/12:10w-12:17w/12:19w-12:23w/12:24N-12:25/12:26w-12:30w/12:32w/12:34w-12:41w/12:43w-12:45w/12:46/12:48/12:50w-12:53w/12:54/12:55w-12:56w/12:58w-12:61w/12:62/12:63w-12:66w/12:67/12:68w, DRB1*13:01:01:01:13:02:11/13:02:12w/13:02:13-13:29/13:30?/13:31-13:53/13:54w/13:55?/13:56-13:66:02/13:68-13:76/13:77w/13:78-13:99/13:100w/13:101-13:102/13:103w/13:104-13:159/13:160w/13:161/13:162w/13:163-13:164/13:165w/13:166-13:182/13:184-13:194/13:196-13:198/13:199w/13:201-13:217/13:218w/13:219-13:227/13:229-13:247, DRB1*14:01:01-14:09/14:12:01-14:38:02/14:40-14:45/14:47/14:48w/14:49-14:54:01:02/14:54:03-14:56/14:58-14:60/14:62-14:65/14:67-14:124/14:125w/14:126:01-14:140/14:142/14:144-14:147/14:149-14:176/14:177w/14:178-14:181/14:183-14:190, DRB3*01:14w	DR17(3), -, DR18(3), DR3, Null, DR8, DR12(5), DR13(6), DR14(6), DR1403, DR1404, DR6	see below
		DRB1*03:01:06/03:01:07w/03:01:14w/03:01:15/03:09?/03:13:01-03:13:02/03:46w/03:50/03:59w/03:64/03:67N/03:69/03:86/03:88/03:117/03:130w/03:135w, DRB1*13:02:12w/13:39/13:78-13:79/13:103w/13:112/13:121/13:128/13:142N/13:160w/13:163/13:165w/13:173/13:181/13:199w/13:218w, DRB1*14:08/14:23:02/14:34/14:64/14:72/14:109/14:115/14:130	DR17(3), -, Null, DR14(6)	170 bp
G3	G9	DRB1*03:10, DRB1*13:43/13:45/13:159/13:171:01/13:179/13:191/13:197/13:217, DRB1*14:01:01-14:01:04/14:07:01-14:07:02/14:16/14:22/14:25-14:26/14:32:01-14:32:03/14:35/14:38:01-14:38:02/14:49/14:53-14:54:01:02/14:54:03-14:55/14:58/14:60/14:62/14:69-14:70/14:74-14:75/14:82/14:86-14:88/14:90/14:92N/14:97/14:99/14:101/14:104-14:105/14:110-14:114/14:117-14:119/14:122/14:124/14:125w/14:128-14:129/14:131-14:133/14:137N/14:139-14:140/14:142/14:146-14:147/14:149-14:151/14:153/14:157-14:158/14:162-14:164/14:166N/14:168/14:171-14:173/14:178/14:184-14:186/14:189-14:190	DR17(3), -, DR14(6), DR6, DR13(6), Null	175 bp
		DRB1*03:01:01:01:05/03:01:07w/03:01:08-03:01:13/03:01:14w/03:01:15-03:07/03:09?/03:11:01/03:12?/03:13:01-03:37/03:38w/03:39-03:41:02/03:43-03:45/03:47-03:58/03:59w/03:60-03:63/03:66-03:78/03:79w/03:80-03:86/03:88-03:91/03:93-03:110/03:112-03:126/03:127w/03:128-03:129/03:131-03:134/03:135w/03:136-03:139/03:141-03:142, DRB1*08:20, DRB1*13:01:01:01-13:02:11/13:02:12w/13:02:13-13:16/13:18-13:29/13:30?/13:31-13:42/13:44/13:46-13:53/13:54w/13:55?/13:56-13:66:02/13:68-13:76/13:77w/13:78-13:99/13:100w/13:101-13:102/13:103w/13:104-13:115/13:117-13:158/13:160w/13:161/13:162w/13:163-13:164/13:166-13:170/13:171:02-13:174/13:176-13:178/13:180-13:182/13:184-13:190/13:192-13:194/13:196/13:198/13:199w/13:201-13:213/13:215-13:216/13:218w/13:219-13:227/13:229-13:247, DRB1*14:02:01:01-14:03:02/14:05:01:01-14:06:03/14:09/14:12:01-14:14/14:17-14:21/14:23:01/14:23:03-14:24/14:27:01-14:27:02/14:29-14:30/14:33/14:36-14:37/14:40-14:45/14:47/14:48w/14:51/14:56/14:59/14:63-14:65/14:67/14:77-14:78/14:80-14:81/14:83-14:85/14:89/14:91/14:94-14:96/14:98/14:100/14:102-14:103/14:106/14:108-14:109/14:115-14:116/14:121/14:123/14:127:01-14:127:02/14:130/14:134-14:136/14:144/14:154-14:156/14:159-14:161/14:165/14:167/14:169-14:170/14:174/14:176/14:177w/14:179/14:181/14:183/14:187-14:188N, DRB3*01:14w	- -, DR1404, DR14(6), Null	165 bp 165 bp
		DRB1*08:15/08:21, DRB1*12:48		165 bp
		DRB1*08:08, DRB1*14:04:01-14:04:03/14:28/14:31/14:50/14:68:01-14:68:02/14:71/14:73/14:76/14:79/14:93/14:107/14:120/14:138/14:140/14:145/14:152N/14:180		165 bp

Position	Mix	Allele	Serology	Size
		DRB1*03:92, DRB1*08:01:01-08:01:02/08:01:04-08:01:05/08:02:01:01-08:04:01/08:04:03-08:07/08:09-08:14/08:16-08:19/08:21-08:24:02/08:25w/08:26-08:30:03/08:32-08:33/08:34w/08:35-08:40/08:42-08:46/08:47w/08:48-08:51/08:52w/08:53-08:56/08:58-08:62/08:64-08:68:02/08:70-08:74/08:76-08:79/08:81-08:82, DRB1*12:01:01-12:01:07w/12:01:09w-12:02:05w/12:02:07w-12:03:03w/12:05w-12:08w/12:09/12:10w-12:17w/12:19w-12:23w/12:24N-12:25/12:26w-12:30w/12:32w/12:34w-12:41w/12:43w-12:45w/12:46/12:48/12:50w-12:53w/12:54/12:55w-12:56w/12:58w-12:61w/12:62/12:63w-12:66w/12:67/12:68w, DRB1*13:17/13:116/13:175/13:214, DRB1*14:15/14:52/14:126:01-14:126:02/14:175	-, DR8, Null, DR12(5), DR13(6)	170 bp
		DRB1*03:10/03:97/03:126, DRB1*08:08/08:29, DRB1*11:17/11:52-11:54:02/11:89/11:150/11:202, DRB1*12:66, DRB1*13:43/13:45/13:76/13:159/13:171:01/13:179/13:188/13:191/13:197/13:206/13:217, DRB1*14:01:01-14:01:04/14:04:01-14:05:04/14:07:01-14:08/14:11/14:14/14:16/14:18/14:22-14:23:04/14:25-14:26/14:28/14:31-14:33/14:35-14:36/14:38:01-14:39/14:42-14:45/14:49-14:51/14:53-14:56/14:58-14:62/14:64/14:68:01-14:76/14:79/14:82/14:86-14:88/14:90-14:93/14:95-14:97/14:99/14:101/14:103-14:107/14:110-14:114/14:117-14:120/14:122/14:124/14:125w/14:126:01-14:126:02/14:128-14:134/14:137N-14:140/14:142/14:145-14:155/14:157-14:158/14:160-14:164/14:166N-14:169/14:171-14:173/14:175/14:178/14:180/14:184-14:190	DR17(3), -, DR11(5), DR14(6), DR1404, DR6, DR13(6), Null	see below
		DRB1*08:08, DRB1*14:04:01-14:04:03/14:28/14:31/14:50/14:61/14:68:01-14:68:02/14:71/14:73/14:76/14:79/14:93/14:107/14:120/14:138/14:145/14:152N/14:180	-, DR1404, DR14(6), Null	175 bp
F3	F9	DRB1*12:66, DRB1*14:04:01-14:04:02/14:11/14:28/14:50/14:61/14:68:01/14:71/14:73/14:76/14:79/14:93/14:120/14:126:01-14:126:02/14:138/14:145/14:148/14:152N/14:175	-, DR1404, DR14(6), Null	225 bp
	Mix 19	DRB1*03:10, DRB1*13:43/13:45/13:159/13:171:01/13:179/13:191/13:197/13:217, DRB1*14:01:01-14:01:04/14:07:01-14:07:02/14:16/14:22/14:25-14:26/14:32:01-14:32:03/14:35/14:38:01-14:39/14:49/14:53-14:54:01:02/14:54:03-14:55/14:58/14:60/14:62/14:69-14:70/14:74-14:75/14:82/14:86-14:88/14:90/14:92N/14:97/14:99/14:104-14:105/14:110-14:114/14:117-14:119/14:122/14:124/14:125w/14:128-14:129/14:131-14:133/14:137N/14:139-14:140/14:142/14:146-14:147/14:149-14:151/14:153/14:157-14:158/14:162-14:164/14:166N/14:168/14:171-14:173/14:184-14:186/14:189-14:190	DR17(3), -, DR14(6), DR6, DR13(6), Null	175 bp
		DRB1*03:97/03:126, DRB1*11:17/11:52-11:54:02/11:89/11:150/11:202, DRB1*13:76/13:188/13:206, DRB1*14:01:01-14:01:04/14:05:01-14:05:04/14:07:01-14:08/14:14/14:18/14:23:01-14:23:04/14:26/14:33/14:35-14:36/14:38:01/14:39/14:42-14:45/14:51/14:54:01-14:54:06/14:56/14:58-14:60/14:62/14:64/14:70/14:72/14:75/14:82/14:86/14:88/14:90-14:92N/14:95-14:97/14:99/14:101/14:103/14:106/14:110/14:112-14:114/14:117-14:118/14:122/14:124/14:125w/14:129-14:134/14:137N/14:139-14:140/14:142/14:146-14:147/14:149-14:151/14:153-14:155/14:157-14:158/14:160-14:163/14:166N-14:169/14:178/14:184-14:190	-, DR11(5), DR14(6), DR6, Null	225 bp

Position	Mix	Allele	Serology	Size
E3	Mix 20	DRB1*03:126, DRB1*04:211, DRB1*11:09/11:28:02w/11:58:01w/11:83/11:87/11:113/11:115w/11:182, DRB1*12:58, DRB1*13:05:01-13:06/13:18/13:26:01-13:26:02/13:42/13:50:02w-13:50:03w/13:56/13:77/13:119/13:136/13:144/13:146/13:156-13:158/13:163/13:181/13:189w/13:193/13:199/13:203/13:235, DRB1*14:02:01-14:03:02/14:06:01-14:06:03/14:09/14:12:01-14:13/14:17-14:18/14:27:01-14:27:02/14:29-14:30/14:33/14:46-14:48/14:51-14:52/14:59/14:63-14:64/14:67/14:78/14:80-14:81/14:83/14:85/14:89/14:95/14:98w/14:106/14:108/14:115/14:121/14:132-14:135/14:144/14:154/14:165/14:170/14:174/14:176-14:177/14:179, DRB1*16:08w	-, DR11(5), DR13(6), DR14(6), DR1403, DR6	see below
E9	Mix 20	DRB1*03:126, DRB1*04:211, DRB1*11:09/11:28:02w/11:58:01w/11:83/11:87/11:113/11:115w/11:182, DRB1*12:58, DRB1*13:05:01-13:06/13:26:01-13:26:02/13:42/13:50:02w-13:50:03w/13:56/13:77/13:136/13:157/13:163/13:181/13:189w/13:193/13:199/13:203/13:235, DRB1*14:02:01-14:02:03/14:06:01-14:06:03/14:09/14:13/14:17-14:18/14:29-14:30/14:33/14:46-14:48/14:51-14:52/14:59/14:64/14:80-14:81/14:83/14:95/14:98w/14:106/14:108/14:121/14:132-14:134/14:154/14:165/14:170/14:176-14:177/14:179, DRB1*16:08w	-, DR11(5), DR13(6), DR14(6), DR6	145 bp
D3	Mix 21	DRB1*13:18/13:119/13:144/13:146/13:156/13:158, DRB1*14:03:01-14:03:02/14:12:01-14:12:02/14:27:01-14:27:02/14:63/14:67/14:78/14:85/14:89/14:98w/14:115/14:135/14:144/14:174	DR13(6), -, DR1403, DR14(6)	150 bp
C3	Mix 22	DRB1*09:07, DRB4*01:02?, DRB5*01:01-01:01-01:25/01:26w/01:27N-01:35, DRB5*02:02:01-02:18	-, DR51, Null	175 bp/ 210 bp
B3	Mix 23	DRB1*03:42/03:87, DRB1*14:141, DRB3*01:01:02:01-01:13/01:15-01:47, DRB3*02:01-02:25/02:28-02:46/02:48-02:57/02:59-02:65/02:67N-02:68, DRB3*03:01:01-03:15	-, DR52, Null	215 bp
A3	Mix 24	DRB4*01:01:01-01:04/01:05?/01:06-01:07:02/01:08?/01:09-01:22/01:23w/01:24-01:26/01:27?/01:28-01:59/01:60?/01:61N-01:63, DRB4*02:01N, DRB4*03:01N	DR53, -, Null	215 bp/ 255 bp
		Negative Control	-	none (440 bp)

**Mix 7:** HLA-DRB1\*03:81 serology unclear

**HLA-DRB1\*08:04:02** is not listed since the primer matching sequences are unknown

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

w = weak

? = nucleotide sequence information not available for the primer matching sequence

**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)

**Table 2:** Sizes of the PCR products and allele specificities of each **HLA-DQB1\*** CTS-PCR-SSP primer mix (**Lot-No DQB12-0**) based on IMGT/HLA Sequence Database Release 3.31.0, January 2018

Position	Mix	Allele	Serology	Size
H4	Mix 1	DQB1*04:10w, DQB1*05:01:01:01:05:01:13/05:01:15/05:01:16w/05:01:17-05:01:18/05:01:19w/05:01:20-05:03:09/05:03:11-05:20/05:22-05:25/05:26w/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/05:129w/05:130w/05:131-05:158, DQB1*06:23/06:156/06:162/06:169	- , DQ5(1), Null	see below
		DQB1*04:10w, DQB1*05:03:02/05:43:02, DQB1*06:23/06:156/06:162/06:169	- , DQ5(1)	135 bp
G4	Mix 2	DQB1*05:01:01:01:05:01:13/05:01:15/05:01:16w/05:01:17-05:01:18/05:01:19w/05:01:20-05:03:09/05:03:11-05:20/05:22-05:25/05:26w/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/05:129w/05:130w/05:131-05:158	DQ5(1), -, Null	225 bp
		DQB1*03:194, DQB1*06:01:01:01:06:01:15/06:02:07/06:03:01:01-06:03:06/06:03:08-06:03:18/06:03:20-06:03:27/06:08:01-06:08:03/06:11:02-06:12/06:14:01/06:14:03/06:17/06:21/06:26N/06:28/06:30-06:31/06:35/06:40-06:45/06:53:01-06:57/06:59-06:65/06:67/06:82/06:87/06:90-06:92/06:98-06:105/06:108/06:110/06:120/06:128/06:132-06:134/06:140-06:145/06:148/06:149w/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	- , DQ6(1), DQ1, Null	see below
G10	Mix 2	DQB1*06:01:01:01-06:01:15/06:35/06:43/06:45/06:53:01-06:57/06:98-06:105/06:108/06:120/06:132/06:140/06:142/06:157/06:168/06:177/06:181/06:194/06:205/06:209/06:214/06:229/06:239/06:243/06:245-06:246	DQ6(1), -, Null	160 bp
		DQB1*03:194, DQB1*06:02:07/06:03:01:01-06:03:06/06:03:08-06:03:18/06:03:20-06:03:27/06:08:01-06:08:03/06:11:02-06:12/06:14:01/06:14:03/06:17/06:21/06:26N/06:28/06:30-06:31/06:40-06:42/06:44/06:59-06:65/06:67/06:82/06:87/06:90-06:92/06:110/06:128/06:133-06:134/06:141/06:143-06:145/06:148/06:149w/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	- , DQ6(1), DQ1, Null	170 bp

Position	Mix	Allele	Serology	Size
F4	F10	Mix 3	- , DQ6(1), DQ1, Null	see below
		<p>DQB1*03:08/03:137/03:228, DQB1*06:02:01:01-06:02:07/06:02:09-06:03:03/06:03:05w/06:03:06-06:03:07/06:03:11-06:03:13/06:03:15/06:03:17-06:03:18/06:03:20-06:03:25/06:03:27/06:08:01/06:10-06:11:03/06:13:01-06:14:02/06:16/06:19:01-06:20/06:23-06:24/06:26N/06:28-06:31/06:33/06:40-06:41/06:44/06:46-06:47/06:49-06:50/06:60-06:63/06:65w/06:67-06:68/06:70-06:84/06:87/06:90/06:92/06:95-06:97/06:106-06:107/06:109-06:117/06:119/06:122-06:128/06:130-06:131/06:133-06:134/06:136-06:138/06:141/06:143-06:144N/06:146:01-06:148/06:150-06:152/06:154/06:156/06:159/06:161-06:163/06:165-06:166/06:169-06:170/06:173-06:176/06:178-06:179N/06:182-06:185/06:187-06:188/06:191-06:192/06:195/06:197-06:200/06:201w/06:203/06:206:01-06:206:02/06:208/06:210-06:211/06:213/06:215-06:216N/06:219/06:221-06:228/06:230/06:232-06:238/06:240/06:242/06:244/06:248-06:249</p> <p>DQB1*03:08/03:137/03:228, DQB1*06:02:01:01-06:02:06/06:02:09-06:02:28/06:03:07/06:10-06:11:01/06:13:01-06:13:02/06:14:02/06:16/06:19:01-06:20/06:24/06:29/06:33/06:46-06:47/06:49-06:50/06:68/06:70-06:81/06:83-06:84/06:95-06:97/06:106-06:107/06:109/06:111-06:117/06:119/06:122-06:127/06:130-06:131/06:136-06:138/06:146:01-06:147/06:150-06:152/06:159/06:161/06:163/06:166/06:173-06:176/06:178-06:179N/06:182-06:183/06:188/06:192/06:197-06:198/06:200/06:201w/06:206:01-06:206:02/06:208/06:211/06:213/06:215-06:216N/06:219/06:224-06:228/06:232-06:233/06:235-06:237/06:240/06:242/06:249</p> <p>DQB1*06:02:01:01-06:02:04/06:02:06-06:02:07/06:02:09-06:02:15/06:02:17-06:02:18/06:02:20-06:03:03/06:03:05w/06:03:06-06:03:07/06:03:11-06:03:13/06:03:15/06:03:17-06:03:18/06:03:20-06:03:25/06:03:27/06:08:01/06:10-06:11:03/06:13:01/06:14:01-06:14:02/06:16/06:19:02-06:20/06:23-06:24/06:26N/06:28-06:31/06:33/06:40-06:41/06:44/06:46-06:47/06:49-06:50/06:60-06:63/06:65w/06:67-06:68/06:70-06:79:01/06:80-06:84/06:87/06:90/06:92/06:95-06:97/06:106-06:107/06:109-06:113/06:115-06:117/06:122/06:124-06:128/06:130-06:131/06:133-06:134/06:136-06:137/06:141/06:143-06:144N/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/06:182-06:185/06:187-06:188/06:191-06:192/06:195/06:197-06:200/06:201w/06:203/06:206:01/06:208/06:210-06:211/06:213/06:216N/06:218-06:219/06:221-06:228/06:230/06:232-06:238/06:240/06:242/06:244/06:248-06:249</p>		
E4	E10	Mix 4	DQ6(1), -, Null	170 bp
D4	D10	Mix 5	DQ2, -, Null	200 bp

Position	Mix	Allele	Serology	Size
C4	Mix 6	DQB1*03:01:01:01:12/03:01:01:14-03:01:39/03:04:01:03:04:01:03:09-03:10:02:02/03:13-03:14:02/03:16/03:19:01-03:19:02/03:21-03:24/03:27-03:29/03:35/03:36w/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/03:172-03:173/03:177-03:180/03:182-03:183/03:186-03:188/03:191-03:198/03:201-03:202/03:206-03:208/03:216-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:252-03:257/03:260/03:264/03:266-03:268/03:271, DQB1*04:10, DQB1*05:03:02?, DQB1*06:35/06:53:01-06:53:02	DQ7(3), -, DQ3, Null, DQ5(4)	see below
		DQB1*03:01:01:01:12/03:01:01:14-03:01:39/03:04:01:03:04:01:03:09/03:13/03:16/03:19:01-03:19:02/03:21-03:22/03:24/03:27-03:29/03:35/03:36w/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/03:172-03:173/03:177-03:180/03:182-03:183/03:186-03:188/03:191-03:194/03:196-03:198/03:201-03:202/03:206-03:208/03:216/03:218-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:252-03:257/03:260/03:264/03:266-03:268/03:271, DQB1*06:35/06:53:01-06:53:02	DQ7(3), -, Null	100 bp
		DQB1*03:01:01:01:12/03:01:01:14-03:01:39/03:04:01:03:04:01:03:09-03:10:02:02/03:13-03:14:02/03:16/03:19:01-03:19:02/03:21-03:22/03:24/03:27-03:29/03:35/03:36w/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/03:172-03:173/03:177-03:180/03:182-03:183/03:186-03:188/03:191-03:194/03:196-03:198/03:201-03:202/03:206-03:208/03:216/03:218-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:252-03:257/03:260/03:264/03:266-03:268/03:271	DQ7(3), -, DQ3, Null	215 bp
B4	Mix 7	DQB1*03:23:01:03:23:02/03:217, DQB1*04:10, DQB1*05:03:02?	-, DQ5(1)	120 bp
		DQB1*03:04:01:03:04:03/03:14:01-03:14:02/03:70/03:80/03:179w, DQB1*06:246w	DQ7(3), -	175 bp
A4	Mix 8	DQB1*03:02:01:01:03:02:09/03:02:11-03:02:15/03:02:16w/03:02:17-03:02:26/03:07-03:08/03:11/03:32/03:37/03:45/03:62-03:64/03:66N-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/03:240/03:245/03:247/03:251/03:261/03:263/03:265/03:269N/03:273-03:274, DQB1*06:29/06:123/06:139/06:246	DQ8(3), -, Null	130 bp
H5	Mix 9†	DQB1*03:02:01:01:03:02:01:06/03:02:09/03:02:12/03:02:21-03:02:24/03:05:01/03:211/03:245/03:247/03:250-03:251/03:263	DQ8(3), -	190 bp
G5	Mix 10	DQB1*02:03/02:77, DQB1*03:03:02:01-03:03:05/03:03:06w/03:03:07-03:03:15/03:06w/03:12/03:15/03:20/03:25:01w-03:25:02w/03:26/03:30-03:31/03:33-03:34/03:38-03:41/03:43/03:65/03:74/03:79/03:86-03:91Q/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, DQB1*04:03:01w-04:03:03w, DQB1*06:03:10/06:51:01/06:66/06:96/06:168/06:172	DQ2, -, DQ9(3), DQ3, Null	135 bp
F5	Mix 11†	DQB1*03:03:02:01-03:03:02:05/03:195/03:239/03:248-03:249	DQ9(3), -	177 bp

Position	Mix	Allele	Serology	Size
E5	E11 Mix 12	DQB1*03:01:01:01:12/03:01:01:14-03:01:01:19/03:01:03:03:01:05/03:01:06w/03:01:07-03:02:02/ 03:02:04w/03:02:05-03:02:12/03:02:13w/03:02:14-03:02:22/03:02:24-03:02:05/03:03:04-03:04:03/03:05:03- 03:05:04/03:07-03:17:01/03:18-03:19:02/03:21-03:22/03:23:02-03:24/03:25:02-03:36/03:38-03:53/03:54w/03:55- 03:60/03:62-03:71/03:74/03:76-03:99Q/03:101-03:111/03:113-03:117/03:119-03:128/03:130-03:131/03:133-03:135/ 03:137-03:155/03:157-03:161/03:163-03:174/03:176-03:180/03:182/03:184-03:203/03:204w/03:205-03:222/03:224- 03:225/03:227-03:236/03:239-03:249/03:251/03:253-03:261/03:263-03:268/03:269Nw/03:270-03:274, DQB1*05:11:01, DQB1*06:02:02/06:03:02/06:04:08/06:09:07	DQ7(3), -, DQ8(3), DQ9(3), Null, DQ6(1)	160 bp
D5	D11 Mix 13	DQB1*03:132, DQB1*04:01:01:01-04:02:01:01/04:02:01:04-04:02:01:07/04:02:03-04:02:07/04:02:09-04:03:01/04:04- 04:30/04:32-04:42	-, DQ4, Null	210 bp
C5	C11 Mix 14	Negative Control		none (440 bp)

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

**Positions:** B5 - A5, H6 - A6, B11 - A11 and H12 - A12 are empty wells.

**w** = weak

**?** = nucleotide sequence information not available for the primer matching sequence

**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!** HLA-DQB1 alleles which are not sequenced in the primer binding sites of mixes 9 and 11 (according to the IMGT/HLA Database of January 2018) have been excluded from the list of allele specificities of these mixes.

**Table 3:** Amplification patterns of **HLA-DRB1\*** and other HLA-DRB\* alleles detected by the HLA-DRB1\* CTS-PCR-SSP primer mixes (**Lot No. DR42-2**) based on IMGT/HLA Sequence Database Release 3.31.0, January 2018

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DRB1*01:01:01:01:02:11/01:02:13/01:04:01:17/01:19:01:20:02/01:23:01:32/01:35:01:38/01:41/01:43/01:45:01:48/01:50:01:59/01:62N:01:64/01:66-01:74/01:77-01:84	DR1, -, Null	1																						
DRB1*01:03:01:01:03:02/01:42/01:61	DR103, -	1	2																					
DRB1*01:21	-	1							w															
DRB1*01:34	-	1										w												
DRB1*01:39N	Null	w	w																					
DRB1*01:40N/01:49/01:65:01-01:65:02	Null, -	w																						
DRB1*01:75	-	1											13											
DRB1*03:01:01:01:03:01:03/03:01:03/03:01:05:03:01:06/03:01:08-03:01:13/03:01:15-03:01:26/03:04:01-03:04:02/03:06/03:11:01/03:13:01/03:15:01/03:16/03:18-03:20/03:22-03:23/03:25-03:26/03:28/03:30-03:34/03:36-03:37/03:39/03:43-03:45/03:47-03:48/03:50-03:52/03:55-03:56/03:58/03:60-03:62/03:64/03:66-03:73/03:75/03:77-03:78/03:80/03:82-03:83/03:85-03:86/03:89/03:91/03:93-03:96/03:98-03:99/03:104/03:106-03:110/03:112/03:114/03:116-03:118/03:121/03:123-03:124/03:128-03:129/03:132-03:134/03:136-03:139/03:141-03:142	DR17(3), -, DR3, Null				5	6												18						
DRB1*03:01:02/03:13:02/03:15:02	DR17(3), -				w	6													18					
DRB1*03:01:04/03:76/03:84/03:92, DRB1*13:129	DR17(3), -					6													18					
DRB1*03:01:07/03:46/03:59/03:79	DR17(3), -				5	6													w					
DRB1*03:01:14/03:127/03:135	-				w	6													w					
DRB1*03:02:01/03:02:03/03:05:01-03:05:02/03:14/03:27/03:29/03:53/03:74/03:81/03:88/03:90/03:102-03:103/03:115/03:122/03:131	DR18(3), -, DR3				5	7													18					
DRB1*03:02:02/03:05:03	DR18(3), DR3				w	7													18					
DRB1*03:03/03:07/03:17/03:21/03:24/03:35/03:40-03:41:02/03:57/03:63/03:101/03:105/03:113/03:119-03:120	DR18(3), DR3, -				5														18					
DRB1*03:08/03:65/03:140	-				5	6							13											
DRB1*03:09	-				?			7											?					
DRB1*03:10	DR17(3)				5	6													18	19				
DRB1*03:12	DR3				?	?												?	?					
DRB1*03:38	-				5	7													w					



Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DRB1*03:42/03:87, DRB3*01:34	-						6																22	
DRB1*03:49	-					5			8										18					
DRB1*03:54/03:100:01-03:100:02	-					5	w												18					
DRB1*03:97, DRB1*13:45/13:76/13:197/13:206, DRB1*14:01:01-14:01:04/14:05:01-14:05:04/14:07:01-14:08/14:14/14:16/14:22-14:23:04/14:25-14:26/14:32:01-14:32:03/14:35-14:36/14:38:01-14:38:02/14:42-14:45/14:49/14:53-14:54:01:02/14:54:03-14:56/14:58/14:60/14:62/14:69-14:70/14:72/14:74-14:75/14:86-14:88/14:90-14:92N/14:96-14:97/14:99/14:101/14:103/14:105/14:110/14:112-14:114/14:117-14:119/14:122/14:124/14:126:01-14:126:02/14:128-14:131/14:137N/14:139-14:140/14:142/14:146-14:147/14:149-14:151/14:153/14:155/14:157-14:158/14:160/14:162-14:164/14:166N-14:168/14:172-14:173/14:175/14:178/14:184-14:190	-, DR14(6), DR6, DR13(6), Null																		18	19				
DRB1*03:111, DRB1*09:06	-						6																	
DRB1*03:125, DRB1*13:27/13:176	-, DR13(6)						6								15				18					
DRB1*03:126, DRB1*14:95/14:132	-						6												18	19	20			
DRB1*03:130	-						w	7											w					
DRB1*04:01:01-04:05:11/04:05:13-04:11:03/04:12-04:14/04:16-04:60/04:62-04:137/04:139-04:144/04:146-04:153/04:155/04:157N-04:169/04:171-04:210/04:212N-04:237, DRB1*14:10/14:57/14:143/14:182	DR4, -, Null, DR14(6)								8															
DRB1*04:15/04:61/04:138/04:145/04:154/04:170, DRB1*11:102:01-11:102:02/11:175	DR4, -								8				13											
DRB1*04:211	-								8												20			
DRB1*07:01:01-07:01:22/07:03-07:84	DR7, -, Null									9														
DRB1*08:01:01-08:01:02/08:01:04-08:01:05/08:02:01:01-08:04:01/08:04:03-08:07/08:09-08:19/08:21-08:24:02/08:26-08:28/08:30:01-08:30:03/08:33/08:35-08:37/08:39-08:40/08:42-08:46/08:48-08:51/08:54-08:56/08:58-08:62/08:64-08:66/08:68:01-08:68:02/08:70-08:74/08:76-08:79/08:81-08:82, DRB1*14:15	DR8, -, Null									10									18					
DRB1*08:08/08:29, DRB1*14:04:01-14:04:03/14:28/14:31/14:50/14:68:01-14:68:02/14:71/14:73/14:76/14:79/14:93/14:107/14:120/14:138/14:145/14:152N/14:180	-, DR1404, DR14(6), Null									10									18	19				

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
DRB1*08:20/08:67, DRB1*13:07:01-13:09/13:11:01-13:11:02/13:14:01-13:14:03/13:17/13:19/13:22-13:23:02/13:25/13:37/13:44/13:46-13:47/13:50:01/13:52/13:57/13:60/13:62/13:64/13:68/13:70/13:72/13:82-13:84/13:86/13:97:01-13:97:02/13:106-13:107/13:114/13:116/13:132/13:135/13:150/13:172/13:175/13:178/13:180/13:182/13:192/13:204/13:224/13:229/13:231-13:232/13:246, DRB1*14:20-14:21/14:34/14:37/14:40-14:41/14:77/14:84/14:94/14:100/14:102/14:116/14:123/14:127:01-14:127:02/14:136/14:156/14:159/14:181/14:183	- , DR13(6), DR14(6)																	18							
DRB1*08:25/08:47, DRB1*12:16:01-12:16:03/12:22/12:39	-									10			14						W						
DRB1*08:31, DRB1*11:01:01-11:02:02/11:02:04-11:02:05/11:04:01-11:04:12/11:04:14-11:06:03/11:08:01-11:08:03/11:10:01-11:10:02/11:12:01-11:15/11:18-11:19:03/11:21/11:23:01-11:25/11:27:01-11:28:01/11:29:01-11:35/11:37:01-11:39/11:42:01-11:51/11:56-11:57/11:58:02/11:60-11:62:02/11:64-11:66/11:69-11:70/11:72-11:75/11:77-11:82/11:84:01-11:84:03/11:88/11:90-11:93/11:95-11:101:02/11:104/11:106/11:108-11:109/11:111-11:112/11:114/11:116-11:121/11:124/11:126-11:134/11:137/11:140-11:149/11:152-11:155/11:157-11:158/11:160/11:162-11:166/11:169N-11:171/11:174/11:177-11:181/11:183-11:184/11:186/11:188-11:191/11:194-11:201/11:204-11:207/11:209-11:210/11:212/11:214-11:220	DR11(5), -, Null											13													
DRB1*08:32/08:53, DRB1*12:46	-									10			14						18						
DRB1*08:34/08:52	-									10									W						
DRB1*08:38	-								8	10									18						
DRB1*08:41/08:63/08:75, DRB1*11:67/11:193:01-11:193:02	-									10			13												
DRB1*08:69	-									10															
DRB1*09:01:02:01-09:05/09:08/09:10-09:22/09:24-09:32	DR9, -										11														
DRB1*09:07	-										11											21			
DRB1*10:01:01-10:11/10:13-10:22/10:24	DR10, -											12													
DRB1*10:23	-											12	13												
DRB1*11:03:01-11:03:02/11:11:01/11:11:03/11:36/11:41/11:55/11:63:01-11:63:02/11:68/11:76/11:85/11:138-11:139/11:151/11:161/11:168/11:176/11:213	DR11(5), -												13				16								
DRB1*11:07:01/11:11:03:02/11:105/11:107/11:125/11:136/11:173	DR11(5), -				5								13												
DRB1*11:07:02	-				W								13												
DRB1*11:09/11:87	DR11(5), -						7						13	15	17						20				

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DRB1*11:16	DR11(5)/DR13(6)													13		15								
DRB1*11:17/11:52/11:54:01-11:54:02/11:89/11:150/11:159/11:202, DRB1*14:11	-, DR11(5), DR14(6)													13						19				
DRB1*11:20	DR11(5)						7							13		15								
DRB1*11:22	-								8					?										
DRB1*11:26	DR11(5)													?										
DRB1*11:28:02	-							7						13		15	17			w				
DRB1*11:40	-													?		w	16	w						
DRB1*11:53	-					5								13						19				
DRB1*11:58:01/11:115	-													13		15	17				w			
DRB1*11:59	-						6							13		w	16	w						
DRB1*11:83/11:182	-						6							13		15	17				20			
DRB1*11:113	-													13		15	17				20			
DRB1*11:122	-							7						13		w	16	w						
DRB1*11:135	-						6							13										
DRB1*11:203/11:211	-													w										
DRB1*12:01:01-12:01:04/12:01:06-12:01:07/12:01:09-12:02:05/12:02:07-12:03:03/12:05-12:08/12:10-12:15/12:17/12:19/12:21/12:23/12:26-12:30/12:32/12:34-12:38/12:40-12:41/12:43-12:45/12:50-12:53/12:55-12:56/12:59-12:61/12:63-12:65/12:68	DR12(5), -, Null														14				w					
DRB1*12:01:05/12:20	-														w				w					
DRB1*12:01:08/12:02:06/12:18/12:33/12:47	-														14									
DRB1*12:04/12:49	-													13	14									
DRB1*12:09/12:24N-12:25/12:48/12:54/12:62/12:67	-, Null														14					18				
DRB1*12:58	-														14					w		20		
DRB1*12:66	-														14					w	19			
DRB1*13:01:01-13:01:18/13:02:04/13:10/13:15-13:16/13:28/13:35/13:40/13:51/13:53/13:59/13:61:01-13:61:02/13:69/13:79-13:80/13:87/13:91-13:92/13:98/13:102/13:105/13:110/13:112-13:113N/13:117/13:121/13:125/13:127/13:130-13:131/13:137N-13:138/13:141/13:148/13:153/13:166/13:173/13:177/13:184-13:187/13:190/13:201/13:205/13:213-13:215/13:221-13:222/13:226/13:233/13:238/13:242:01-13:242:02/13:245	DR13(6), -, Null															15								

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
DRB1*13:02:01-01-13:02:03/13:02:05-13:02:11/13:02:13/13:31/13:34/13:36/13:39/13:41/13:73-13:74/13:85/13:96:01-13:96:02/13:99/13:104/13:109/13:123-13:124/13:126/13:128/13:140/13:142N-13:143/13:145/13:147/13:155/13:168/13:170/13:171:02/13:198/13:202/13:207-13:212/13:220/13:225/13:236-13:237/13:239-13:241/13:243-13:244	DR13(6), -, Null						7								15			18							
DRB1*13:02:12/13:103/13:165	-						7									15		w							
DRB1*13:03:01-13:04/13:12:01-13:13/13:20-13:21:02/13:24/13:33:01-13:33:03/13:38/13:48-13:49/13:58/13:66:01-13:66:02/13:75/13:78/13:81/13:88-13:90/13:94:01-13:95/13:101/13:108/13:115/13:118/13:122/13:133-13:134/13:149/13:151-13:152/13:154/13:161/13:164/13:167/13:169/13:174/13:194/13:216/13:219/13:227/13:230/13:247, DRB1*14:65	DR13(6), -							7								15	17	18			20				
DRB1*13:05:01-13:05:03/13:26:01-13:26:02/13:136/13:158/13:203, DRB1*14:27:01-14:27:02	DR13(6), -, DR14(6)																								
DRB1*13:06/13:146/13:156	DR13(6), -															15		18			20				
DRB1*13:18/13:42	DR13(6)															15	17	18			20				
DRB1*13:29	DR13(6)						7										16	18							
DRB1*13:30/13:55	-																?	?							
DRB1*13:32/13:93	-															15	16	18							
DRB1*13:43/13:188, DRB1*14:169	-																16	18							
DRB1*13:50:02-13:50:03/13:189	-							7								15	17	18		w					
DRB1*13:54	DR14(6)																16	w							
DRB1*13:56/13:119/13:235, DRB1*14:02:01-14:03:02/14:09/14:30/14:47/14:89/14:115/14:135/14:144/14:174/14:179	-, DR14(6), DR1403							7										18			20				
DRB1*13:63	-							7								w	16	w	18						
DRB1*13:65/13:120/13:139	-							7								15	16	18							
DRB1*13:67	-							7								15									
DRB1*13:71	-						6										16	18							
DRB1*13:77, DRB1*14:177	-																	w			20				
DRB1*13:100/13:162	-																		w						
DRB1*13:111	-															w	16	w	18						
DRB1*13:144	-						6									15	17	18			20				
DRB1*13:157, DRB1*14:67	-							7								15		18			20				
DRB1*13:159/13:171:01/13:179	-							7								15		18			20				
DRB1*13:160/13:218	-															15		w							

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DRB1*13:163/13:181/13:193, DRB1*14:06:01-14:06:03/14:12:01-14:12:02/14:17/14:29/14:52/14:80-14:81/14:83/14:108/14:121/14:165/14:176	-, DR14(6), DR6																	18	20					
DRB1*13:183/13:200N	-, Null															15								
DRB1*13:191/13:217	-															15		18	19					
DRB1*13:196, DRB1*14:24/14:109	-							7										18						
DRB1*13:199	-							7								15	17	w	20					
DRB1*13:223/13:234	-															w		18						
DRB1*13:228	-															16								
DRB1*14:13/14:85	DR14(6), -							7								16		18	20					
DRB1*14:18/14:33/14:59/14:64/14:106/14:133/14:154	DR6, -																	18	19	20				
DRB1*14:19	DR14(6)							?										18						
DRB1*14:39/14:54:02/14:61	-																		19					
DRB1*14:46	-							7												20				
DRB1*14:48	-							7										w	20					
DRB1*14:51/14:134	-							7										18	19	20				
DRB1*14:63	-							7								15	16	18	20					
DRB1*14:78	-															15	16	18	20					
DRB1*14:82	-							6										18	19					
DRB1*14:98	-							7										18	w					
DRB1*14:104/14:111	-										w							18	19					
DRB1*14:125	-																	w	w					
DRB1*14:141, DRB3*01:02:01-01:07/01:09-01:13/01:15-01:33/01:35-01:41/01:43-01:45/01:47, DRB3*02:01-02:05/02:07-02:17/02:19/02:21-02:25/02:28-02:46/02:48-02:57/02:59-02:65/02:67N-02:68, DRB3*03:01:01-03:15	-, DR52, Null																					22		
DRB1*14:148	-																		19					
DRB1*14:161	-								8									18	19					
DRB1*14:170	-																16	18	20					
DRB1*14:171	-																	18	19					
DRB1*15:01:01-01:15:01:21/15:01:23-15:20/15:22-15:33/15:35-15:98/15:100-15:108/15:110-15:112/15:114/15:116-15:147	DR15(2), -, DR2, Null			3																				
DRB1*15:21, DRB1*16:09:01-16:10/16:33/16:36-16:37	-, DR16(2)			3	4																			

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
DRB1*15:99/15:109	-			3									13											
DRB1*15:113N	Null		w																					
DRB1*16:01:01-16:01:08/16:01:10-16:05:02/16:07/16:11-16:15/16:17-16:26/16:28-16:32/16:34-16:35/16:38:01-16:47	DR16(2), -, DR2, Null		4																					
DRB1*16:01:09	-		w																					
DRB1*16:08	-		4		4		7								15	17	w							
DRB1*16:16/16:27	-		4									13												
DRB3*01:08/01:46, DRB3*02:20	-						7																22	
DRB3*01:14	-					w											w							
DRB3*01:42, DRB3*02:18	-											13											22	
DRB3*02:06	-							?														22		
DRB4*01:01:01-01:01:02/01:03:01:01-01:04/01:06-01:07:02/01:09-01:22/01:24-01:26/01:28-01:59/01:61N-01:63, DRB4*02:01N, DRB4*03:01N	DR53, -, Null																							23
DRB4*01:02	-																					?	23	
DRB4*01:05/01:08/01:27/01:60	DR53, -																							?
DRB4*01:23	-																							w
DRB5*01:01:01-01:12/01:14-01:25/01:27N-01:35, DRB5*02:02:01-02:18	DR51, -, Null																					21		
DRB5*01:13	-												13										21	
DRB5*01:26	-																						w	

w = weak

? = nucleotide sequence information not available for the primer matching sequence (HLA-DRB1\*08:04:02 is not listed)

**Table 4:** Amplification patterns for all detectable **HLA-DQB1\*** specificities (**Lot-No DQB12-0**) based on IMGT/HLA Sequence Database Release 3.31.0, January 2018

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13
DQB1*02:01:01-02:01:23/02:02:01:01-02:02:05/02:04:02:24/02:26-02:34/02:36/02:38-02:39/02:41-02:45/02:48-02:71/02:73-02:76/02:78-02:89/02:91-02:104	DQ2, -, Null					5								
DQB1*02:01:24/02:37/02:46-02:47/02:90	-					w								
DQB1*02:03/02:77	DQ2, -					5					10			
DQB1*03:01:01-03:01:01-12/03:01:01-14-03:01:01-19/03:01:03-03:01:05/03:01:07-03:01:39/03:09-03:10/02:02/03:13/03:16/03:19-03:19-03:19-02/03:21-03:22/03:23-03:24/03:27-03:29/03:35/03:42/03:44/03:46-03:53/03:55-03:60/03:69/03:71/03:76-03:77/03:82-03:84N/03:92-03:94/03:101-03:103/03:108-03:109/03:114-03:116/03:119-03:121/03:127-03:128/03:130-03:131/03:133-03:135/03:138-03:140/03:142-03:144/03:147/03:150/03:152/03:154/03:157-03:160/03:163-03:167/03:169-03:170/03:172-03:173/03:180/03:182/03:186-03:188/03:191-03:193/03:196-03:198/03:201-03:202/03:206-03:208/03:216-03:219/03:231-03:232/03:235-03:236/03:241-03:243/03:246/03:253-03:257/03:260/03:264/03:266-03:268/03:271	DQ7(3), -, Null DQ3, Null					6						12		
DQB1*03:01:02/03:23-03:23/03:73/03:75/03:118N/03:129/03:162/03:183/03:252	DQ7(3), -, Null					6								
DQB1*03:01:06/03:54	-					6							w	
DQB1*03:02:01:01-03:02:01-06/03:02:09/03:02:12/03:02:21-03:02:22/03:02:24/03:211/03:245/03:247/03:251/03:263	DQ8(3), -								8	9			12	
DQB1*03:02:03:02:05-03:02:08/03:02:11/03:02:14-03:02:15/03:02:17-03:02:20/03:02:25-03:02:26/03:07/03:11/03:32/03:45/03:62-03:64/03:66N-03:68/03:81/03:85/03:106-03:107/03:125/03:146/03:153/03:161/03:174/03:178/03:184-03:185/03:189-03:190/03:199/03:203/03:205/03:210/03:213N-03:215/03:220-03:221/03:224/03:229/03:233/03:240/03:261/03:265/03:273-03:274	DQ8(3), -, Null DQ8(3), -, Null								8					
DQB1*03:02:03:03:37/03:175/03:223/03:237N, DQB1*06:139	DQ8(3), -, Null								8					
DQB1*03:02:04/03:02:13/03:204/03:269N	DQ8(3), -, Null								8			w		
DQB1*03:02:10/03:05-03:03:05:04/03:17:01/03:18/03:78/03:110/03:148-03:149/03:244/03:259/03:272	-, DQ8(3)												12	
DQB1*03:02:16/03:225	-								w				12	
DQB1*03:02:23	-								8	9				
DQB1*03:03:02:01-03:03:02:05/03:239/03:248-03:249	DQ9(3), -										10	11	12	
DQB1*03:03:03/03:20/03:112/03:136/03:156/03:238, DQB1*06:51:01	DQ9(3), -										10			
DQB1*03:03:04-03:03:05/03:07-03:03:15/03:12/03:15/03:26/03:30-03:31/03:33-03:34/03:38-03:41/03:43/03:65/03:74/03:79/03:86-03:91Q/03:95N-03:99Q/03:104-03:105/03:111/03:113/03:117/03:123-03:124/03:141/03:155/03:168/03:176-03:177/03:200/03:209/03:212/03:222/03:227/03:230/03:234/03:258/03:270	-, Null										10		12	
DQB1*03:03:06/03:25:02/03:126/03:145	-										w		12	
DQB1*03:04:01-03:04:03/03:14:01-03:14:02/03:80	DQ7(3), -						6	7					12	
DQB1*03:05:01/03:250	DQ8(3), -									9				

Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13
DQB1*03:06/03:25:01, DQB1*04:03:02-04:03:03	DQ3, -										w			
DQB1*03:08/03:228	-			3					8				12	
DQB1*03:36/03:122/03:151/03:171	-					w							12	
DQB1*03:70	-							7	8				12	
DQB1*03:132, DQB1*04:01:01-04:02:01:01/04:02:01-04:04:02:01:07/04:02:03-04:02:07/04:02:09-04:02:14/04:04-04:09/04:11-04:30/04:32-04:42	-, DQ4, Null													13
DQB1*03:137	-			3							10		12	
DQB1*03:179	-							w	8				12	
DQB1*03:194	-		2				6						12	
DQB1*03:195	-						6					11	12	
DQB1*04:03:01	-										w			13
DQB1*04:10	-	w					6							13
DQB1*05:01:01-05:01:13/05:01:15/05:01:17-05:01:18/05:01:20-05:03:01:03/05:03:03-05:03:09/05:03:11-05:10/05:11:02-05:20/05:22-05:25/05:27-05:33/05:35-05:43:02/05:45-05:59/05:61-05:71/05:74-05:81/05:83-05:97/05:99-05:104/05:106-05:112/05:114-05:115/05:117-05:127/05:129/05:131-05:158	DQ5(1), -, Null	1												
DQB1*05:01:16/05:01:19/05:26/05:34/05:44/05:113/05:128N/05:130	-, Null	w												
DQB1*05:03:02	DQ5(1)	1					?							
DQB1*05:11:01	-	1											12	
DQB1*06:01:01-06:01:15/06:03:04/06:03:08-06:03:09/06:03:14/06:03:16/06:03:26/06:08:02-06:08:03/06:12/06:14:03/06:17/06:21/06:42-06:43/06:45/06:54N-06:57/06:59/06:64/06:91/06:98-06:105/06:108/06:120/06:132/06:140/06:145/06:157/06:177/06:181/06:190:01-06:190:02/06:194/06:196/06:205/06:209/06:214/06:229/06:239/06:243/06:245	DQ6(1), -, DQ1, Null		2											
DQB1*06:02:01-06:02:01:04/06:02:03-06:02:06/06:02:09-06:02:28/06:03:07/06:10-06:11:01/06:13:01-06:13:02/06:14:02/06:16/06:19:01-06:20/06:24/06:33/06:46-06:47/06:49-06:50/06:68/06:70-06:81/06:83-06:84/06:95/06:97/06:106-06:107/06:109/06:111-06:117/06:119/06:122/06:124-06:127/06:130-06:131/06:136-06:138/06:146:01-06:147/06:150-06:152/06:159/06:161/06:163/06:166/06:173-06:176/06:178-06:179N/06:182-06:183/06:188/06:192/06:197-06:198/06:200/06:206:01-06:206:02/06:208/06:211/06:213/06:215-06:216N/06:219/06:224-06:228/06:232/06:235-06:237/06:240/06:242/06:249	DQ6(1), -, DQ1, Null			3										
DQB1*06:02:02	DQ6(1)			3									12	
DQB1*06:02:07/06:03:01:01-06:03:01:02/06:03:03/06:03:06/06:03:11-06:03:13/06:03:15/06:03:17-06:03:18/06:03:20-06:03:25/06:03:27/06:08:01/06:11:02-06:11:03/06:14:01/06:26N/06:28/06:30-06:31/06:40-06:41/06:44/06:60-06:63/06:67/06:82/06:87/06:90/06:92/06:110/06:128/06:133-06:134/06:141/06:143-06:144N/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	-, DQ6(1), DQ1, Null		2	3										



Allele	Serology	1	2	3	4	5	6	7	8	9	10	11	12	13
DQB1*06:03:02	DQ6(1)		2	3									12	
DQB1*06:03:05/06:65	-		2	w										
DQB1*06:03:10	-		2							10				
DQB1*06:04:01-06:04:07/06:04:09-06:07:02/06:09:01:01-06:09:03/06:09:05/06:18:01-06:18:02/ 06:22:02/06:25/06:27:01-06:27:02/06:32:01-06:32:02/06:34/06:36/06:38-06:39/06:52/06:58/06:69:01/ 06:85-06:86/06:88-06:89/06:93-06:94/06:118:01-06:118:02/06:129/06:135/06:155/06:158N/06:160/ 06:164/06:171/06:180/06:186/06:189/06:193N/06:202/06:204/06:207/06:217/06:241	DQ6(1), -, Null				4									
DQB1*06:04:08/06:09:07	-				4								12	
DQB1*06:09:06/06:121/06:212	-				w									
DQB1*06:23/06:156/06:162/06:169	-	1		3										
DQB1*06:29/06:123	-			3					8					
DQB1*06:35/06:53:01-06:53:02	-		2				6							
DQB1*06:66/06:172	-				4						10			
DQB1*06:96	-			3							10			
DQB1*06:142	-		2		4									
DQB1*06:149	-		w											
DQB1*06:168	-		2		4						10			
DQB1*06:201	-			w										
DQB1*06:246	-		2					w	8					

w = weak

? = nucleotide sequence information not available for the primer matching sequence

**ATTENTION!** HLA-DQB1 alleles which are not sequenced in the primer binding sites of mixes 9 and 11 (according to the IMGT/HLA Database of January 2018) have been excluded from the list of allele specificities of these mixes.