

WORKING INSTRUCTION

HLA-A* CTS-PCR-SSP TRAY KIT

LOCUS- AND LOT-SPECIFIC MANUAL

To be applied to the following product:

Product No.	Description
101	HLA-A* CTS-PCR-SSP TRAY KIT 

1. Main differences

- **Between Lot A18-0 (the current lot) and Lot A17-4**
The kit was updated to cover new alleles included in the IMGT/HLA Sequence Database of January 2026. Deleted and renamed alleles were taken into consideration.

2. Introduction

- **Intended use:** This kit provides reagents for low/intermediate resolution HLA-A typing using the PCR-SSP method. All serologically detectable HLA-A alleles as well as their splits can be assigned. In addition, some of the DNA-specificities which so far could not be identified by serology can be detected.
- **Allele coverage:** IMGT/HLA Sequence Database Release 3.63.0, January 2026, except
HLA- A*01:01:65-01:01:66/01:01:131/01:01:146/01:01:160/01:38:01-01:38:02/01:72/01:102/01:139/01:167/
01:221/01:267/01:284/01:390/01:399/01:418N/01:450N/01:486, A*02:644, A*11:01:35/11:01:57/11:01:104/
11:23-11:25:03/11:31/11:35/11:40/11:45/11:50Q/11:78N/11:98/11:111-11:112/11:176/11:183/11:191/11:211/
11:223/11:226/11:229/11:250/11:258/11:269/11:290/11:310N/11:346/11:380/11:389/11:392/11:396- 11:397N/
11:432N/11:435/11:450/11:504/11:506, A*24:129, A*25:01:09/25:01:17/25:81, A*26:01:59/26:01:65/26:01:79/
26:01:86/26:01:88/26:60N/26:85/26:125/26:131/26:143-26:144/26:204:01-01:26:204:01:02/26:234/26:264,
A*29:01:07/29:02:36/29:02:40/29:60/29:111/29:179, A*30:12:02/ 30:26/30:82/30:84/30:184Q/30:189/30:206/
30:210/30:239/30:252, A*31:01:07/ 31:01:47/31:21-31:22/31:44:02/31:75/31:90/ 31:104/31:109/ 31:202N/
31:204/31:210/ 31:241N, A*32:01:07/32:01:12/32:01:48/32:28:01- 32:28:02/32:33:02/32:34/32:66/32:71/
32:75/32:94/32:158/32:185, A*33:01:05/33:03:26-33:03:27/33:03:31/33:03:56/33:03:58/33:18:02-33:19/33:30/
33:32:01-33:32:02/33:35/33:66/33:81/33:89/33:122/33:130/33:135/33:140N/33:152:01-33:152:02/33:158-
33:159/33:175Q/33:188/33:215/33:249/33:282N, A*34:24, A*68:01:11/68:01:25/68:01:67/68:02:07/68:48-
68:50:02/68:137/68:184/68:218/68:230/68:234/68:236N/68:251N/68:258/68:286/68:293Q/68:311/68:330,
A*74:01:10/74:16:01/74:48, A*80:02/80:04
These alleles are considered to be rare.
- This manual is only valid for **Lot No. A18-0**
- 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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Table 1: Allele specificities and sizes of the PCR products of each HLA-A* CTS-PCR-SSP primer mix (Lot No. A18-0) based on IMGT/HLA Sequence Database Release 3.63.0, January 2026	5
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Table 2: Amplification patterns for all HLA-A* alleles detected by the HLA-A* CTS-PCR-SSP reagents (Lot-No A18-0) based on IMGT/HLA Sequence Database Release 3.63.0, January 2026	15
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4. Kit Composition

- Number of PCR primer mixes per test: 24 HLA-specific mixes
- Number of tests per tray: 4
- 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 also 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

- The following mixes will give **short** PCR products (<200 bp): Mixes **5, 17, 20, 23 and 24**. These PCR products might be difficult to distinguish from the 90 bp amplification control (internal positive control)!
In general, these specific products will give a much stronger signal than that of the controls. Furthermore, they will not have migrated as far into the gel as the control bands. If you are not sure whether the strong signal is due to a specific or a generic PCR product, you might let the gel run for additional 15 minutes at a lower voltage. By this way the specific band will be separated from the control band, and you will be able to clearly see a double signal at this position: a very strong specific band, and a weaker, shorter amplification control band.
- Since mix **5** corresponds to A*23 and mix **23** to A*02 (both alleles/allele groups are common), it is recommended to start the interpretation by checking these reactions very carefully first!
- Some mixes contain specific primers which may give rise to PCR fragments of **two or more** different sizes simultaneously (see Table 1).
- **Mix 4**: 225 bp and 235 bp (these two bands tend to merge into a single band). An additional weak band of 740 bp may occur, but is usually invisible.
- The following mixes could give false positive reactions: Mixes **2, 7, 8, 21**.

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:

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Fax: +49 6221 564200

E-mail: dna.labor@med.uni-heidelberg.de

13. Appendix

Table 1: Allele specificities and sizes of the PCR products of each **HLA-A*** CTS-PCR-SSP primer mix (**Lot No. A18-0**) based on IMGT/HLA Sequence Database Release 3.63.0, January 2026

Position				Mix	Allele	Serology	Size
H1	H4	H7	H10	Mix 1	A*01:01:01:01:01:01:64/01:01:67-01:01:130/01:01:131?/01:01:132-01:01:145/01:01:147-01:01:159/01:01:160?/01:01:161-01:04:01:02N/01:06-01:33/01:35-01:37:01:02/01:39-01:71/01:73-01:101/01:103-01:138/01:140-01:166/01:168-01:199/01:201-01:220/01:222-01:243/01:245-01:266:02/01:267w/01:268-01:283/01:285N-01:379N/01:381-01:389/01:391-01:398/01:399?/01:400N-01:417N/01:419-01:426/01:428-01:449/01:451N-01:463/01:465/01:467-01:485/01:486?/01:487-01:501, A*11:27/11:38-11:39/11:94/11:209/11:271/11:326, A*23:31/23:45/23:55/23:128, A*24:15/24:41/24:51/24:92/24:235/24:499/24:504/24:551/24:557, A*25:36/25:59/25:65, A*26:29/26:49/26:205, A*32:13, A*66:10, B*07:64, B*15:12:01-15:12:03/15:19/15:270/15:298/15:304N/15:649/15:679/15:716/15:730, C*04:534?	A1, Null, -, A26(10), B76(15)	225 bp
G1	G4	G7	G10	Mix 2	A*01:200/01:244/01:380:01:01-01:380:01:02/01:427/01:464/01:466, A*02:609w/02:1022, A*03:107/03:164/03:413/03:496, A*11:17, A*26:72, A*32:24, A*36:01:01:01-36:16N, A*74:46	-, A36, Null	580 bp
F1	F4	F7	G10	Mix 3	A*02:01:01:01-02:01:07/02:01:09-02:01:15/02:01:18-02:01:19/02:01:21-02:01:25/02:01:27-02:01:51/02:01:53-02:01:63/02:01:65w/02:01:66-02:01:68/02:01:70-02:01:73/02:01:75w/02:01:76-02:01:80/02:01:83-02:01:94/02:01:96-02:03:06/02:03:08-02:03:14/02:03:15w/02:03:16-02:05:02/02:05:04-02:05:08/02:05:09w/02:05:10-02:06:11/02:06:13-02:06:18/02:06:20-02:06:30/02:06:31?/02:06:32-02:07:14/02:07:16-02:08:01/02:09:01:01-02:22:02/02:24:01-02:35:01/02:35:03-02:47/02:49:01-02:49:02/02:51/02:53:01N-02:54/02:55:02-02:56:01/02:57-02:59/02:60:01:01w-02:60:02w/02:61-02:63/02:66-02:71/02:73-02:76:03/02:77-02:79:02/02:81-02:87/02:89:01-02:97:02/02:99:01-02:99:02/02:101:01-02:102/02:104/02:106-02:113:02N/02:115-02:116/02:118/02:120-02:121/02:123-02:128/02:130-02:134/02:136-02:151/02:153:01-02:168/02:170-02:177/02:179-02:184/02:186-02:187/02:189-02:192/02:193w/02:194/02:195:02-02:222N/02:224-02:228/02:230-02:245/02:247-02:253/02:254w/02:255-02:274/02:276-02:278/02:280-02:285/02:286w/02:287/02:289:01/02:290-02:297/02:299-02:300/02:302-02:303/02:305N-02:307/02:308w/02:310/02:311w/02:312-02:338/02:340-02:347/02:349-02:376/02:378-02:382/02:384-02:405/02:407-02:411/02:413-02:453/02:455-02:487/02:488w/02:489-02:490N/02:492-02:503/02:505-02:509/02:511-02:526/02:528:01-02:570:02/02:572-02:581Q/02:583-02:590/02:591:02-02:593/02:594w/02:595-02:600/02:602-02:614:01/02:614:02?/02:615-02:621/02:623-02:640/02:642/02:645-02:648:02/02:649w/02:650-02:661/02:663-02:675N/02:677/02:679-02:680/02:682-02:710N/02:711w/02:712-02:780/02:782-02:788N/02:790-02:825/02:827Q/02:830:01-02:830:02/02:832N-02:871N/02:873-02:875/02:877-02:922/02:924-02:926/02:928-02:943/02:945N-02:984/02:986-02:991/02:993:01-02:1020/02:1021?/02:1022/02:1023?/02:1024-02:1027/02:1030:02-02:1032/02:1033?/02:1034-02:1045Q/02:1047-02:1086/02:1087?/02:1088-02:1104N/02:1105?/02:1106-02:1109/02:1110?/02:1111-02:1144/02:1145?/02:1146-02:1202/02:1204-02:1235/02:1236?/02:1237-02:1258/02:1260-02:1263/02:1264?/02:1265-02:1270, A*23:01:21, A*24:02:76/24:310:02, B*07:02:80, B*15:01:83?/15:10:07	A2, Low A2, -, A203, A210, Null	455 bp

Position				Mix	Allele	Serology	Size
E1	E4	E7	E10	Mix 4	A*01:13/01:176/01:194/01:427/01:466/01:489?, A*02:34w-02:35:03w/02:56:01w-02:56:02w/02:62w/02:103w/02:237w/02:580w/02:741w/02:809w/02:907w/02:927w/02:1171w/02:1258?, A*03:01:01:01-03:193/03:195-03:199/03:201-03:259/03:261-03:531, A*11:130/11:199:01/11:199:02w-11:199:03w/11:222, A*24:673, A*30:55/30:89/30:186, A*32:04/32:17w/32:52:01, A*34:08, A*36:02, A*68:71, A*69:07, A*74:13/74:42?	-, A2, A3, Null	see below
					A*01:13/01:176/01:194/01:489?, A*02:34w-02:35:03w/02:56:01w-02:56:02w/02:62w/02:103w/02:580w/02:741w/02:907w/02:1171w/02:1258?, A*03:01:01:01-03:01:07/03:01:09-03:01:11/03:01:13-03:01:22/03:01:24-03:01:68/03:01:70-03:01:82/03:01:84-03:01:93/03:01:95-03:07:02/03:10-03:11:02N/03:13-03:31/03:33-03:35/03:37-03:40/03:42-03:56:01:02/03:58/03:60-03:71/03:73-03:87/03:90-03:106/03:110/03:112-03:127/03:129N-03:141/03:143-03:148/03:150-03:151/03:153-03:171/03:174-03:175/03:177/03:181-03:193/03:195/03:197:01N-03:197:02N/03:201-03:202/03:204/03:206-03:210/03:212-03:215/03:217-03:218/03:220/03:222-03:242/03:244/03:246-03:251/03:253-03:258/03:261-03:266N/03:268:01-03:272/03:274-03:299/03:301-03:318/03:320-03:329N/03:331-03:381N/03:383-03:395/03:397/03:399-03:412/03:414-03:428/03:430-03:462/03:464Q-03:478/03:480-03:497/03:499-03:522/03:524N-03:531, A*11:199:01/11:199:02w-11:199:03w/11:222, A*30:55/30:186, A*32:17w, A*34:08, A*68:71, A*69:07, A*74:13/74:42?	-, A2, A3, Null	225 bp
					A*01:427/01:466, A*02:237w/02:809w/02:927w, A*03:01:01:01-03:01:11/03:01:13-03:01:29/03:01:31-03:01:34/03:01:36-03:01:49/03:01:51-03:01:89/03:01:91-03:01:105/03:01:107-03:01:131/03:01:133-03:04:03/03:07:01:01-03:09/03:11:01N-03:11:02N/03:13-03:17:02/03:19-03:39/03:41/03:43-03:58/03:60-03:71/03:73-03:87/03:89:02-03:96/03:99-03:104/03:106-03:121/03:123:01-03:134/03:136-03:148/03:150-03:166/03:168N-03:178N/03:181-03:186/03:188-03:193/03:195/03:197:01N-03:199/03:201-03:204/03:206-03:207/03:209-03:220/03:222-03:224/03:226-03:242/03:244/03:246-03:259/03:261-03:288/03:290-03:299/03:301-03:318/03:320-03:325/03:327-03:331/03:333-03:395/03:397-03:451/03:453-03:460/03:462-03:484/03:486-03:531, A*32:04/32:52:01, A*36:02	-, A3, Null	740 bp
					A*01:427/01:466, A*03:01:01:01-03:01:05/03:01:07-03:01:29/03:01:31-03:01:34/03:01:36-03:01:48/03:01:51-03:01:89/03:01:91-03:01:105/03:01:107-03:01:131/03:01:133-03:04:03/03:07:01:01-03:09/03:11:01N-03:17:02/03:19-03:39/03:41/03:43-03:74/03:76-03:83/03:85-03:94/03:96/03:99-03:104/03:107-03:121/03:123:01-03:134/03:136-03:166/03:168N-03:176/03:178N-03:186/03:188-03:193/03:195-03:199/03:201-03:203/03:205-03:207/03:209-03:214/03:216-03:224/03:226-03:234Q/03:236-03:248/03:250-03:259/03:261-03:287/03:290-03:321/03:323N-03:325/03:327-03:331/03:333-03:342N/03:344:01-03:346/03:348-03:376/03:378-03:413/03:415-03:417/03:419-03:451/03:453-03:460/03:462-03:467/03:469-03:484/03:486-03:531, A*11:130, A*24:673, A*30:89, A*32:04, A*36:02	-, A3, Null	235 bp
D1	D4	D7	D10	Mix 5	A*23:01:01:01-23:17:02/23:17:03?/23:18-23:23:02/23:25-23:33/23:35-23:56/23:58-23:65/23:67-23:68/23:70-23:103N/23:105-23:112/23:114-23:127/23:129/23:131-23:136/23:138-23:140/23:141?/23:142N-23:157N, A*24:24/24:71/24:315/24:392/24:527, A*29:07/29:49, A*31:29, A*32:170, A*33:187, B*18:27, B*40:589?, B*51:421?	A23(9), -, Null	195 bp

Position				Mix	Allele	Serology	Size
C1	C4	C7	C10	Mix 6	A*02:46/02:48/02:70/02:129/02:571/02:1050, A*03:30/03:152/03:273, A*11:325, A*23:01:01:01-23:02/23:04-23:08N/23:10:01-23:22/23:23:02-23:27/23:29-23:36/23:38N-23:50/23:52-23:60/23:62-23:68/23:70-23:79/23:81-23:82/23:84N-23:99/23:101-23:112/23:114-23:127/23:129-23:153/23:155-23:157N, A*24:02:01:01-24:02:16/24:02:18-24:02:48/24:02:50-24:02:63/24:02:64w/24:02:65/24:02:66w/24:02:67-24:02:88/24:02:90-24:07:05/24:09N-24:11N/24:13:01-24:15/24:17:01:01-24:20:03/24:22-24:23/24:25-24:28/24:30/24:32-24:41/24:43-24:64/24:66/24:68-24:76/24:78-24:88/24:90:01N-24:128/24:130-24:155N/24:157/24:159-24:190/24:192-24:199/24:201-24:210/24:212-24:236/24:238-24:272:02/24:274-24:289/24:291-24:308/24:311-24:325/24:327-24:341/24:343:01w/24:343:02-24:358/24:360-24:369/24:371-24:388N/24:390-24:391/24:393-24:414/24:415w/24:416-24:427N/24:428Nw/24:429N-24:470/24:472-24:488/24:490-24:505/24:507-24:521/24:522?/24:523-24:561:02/24:563-24:600/24:602-24:605/24:606?/24:607-24:615/24:616?/24:617-24:618/24:620-24:623N/24:625N-24:635/24:637-24:644/24:645?/24:646-24:662/24:664-24:677, A*25:77/25:82, A*31:08/31:234, A*32:79, A*33:21/33:53, A*68:249	A2, -, A23(9), Null, A24(9), Low A24(9), A2403, A9, A24(9)/A3	see below
					A*03:30/03:152/03:273, A*11:325, A*23:31/23:45/23:53/23:70, A*24:17:01:01-24:17:02/24:41/24:62/24:106/24:208:01-24:208:02:02/24:296/24:330/24:488/24:499/24:503/24:535/24:551/24:555/24:557/24:609/24:673, A*25:77/25:82, A*31:08/31:234, A*32:79, A*33:21/33:53, A*68:249	-, A24(9)	435 bp
					A*02:46/02:48/02:70/02:129/02:571/02:1050, A*23:01:01:01-23:02/23:04-23:08N/23:10:01-23:22/23:23:02-23:27/23:29-23:36/23:38N-23:50/23:52-23:60/23:62-23:68/23:71-23:79/23:81-23:82/23:84N-23:99/23:101-23:112/23:114-23:127/23:129-23:153/23:155-23:157N, A*24:02:01:01-24:02:16/24:02:18-24:02:48/24:02:50-24:02:63/24:02:64w/24:02:65/24:02:66w/24:02:67-24:02:88/24:02:90-24:07:05/24:09N-24:11N/24:13:01-24:15/24:17:01:01-24:20:03/24:22-24:23/24:25-24:28/24:30/24:32-24:41/24:43-24:64/24:66/24:68-24:76/24:78-24:88/24:90:01N-24:128/24:130-24:155N/24:157/24:159-24:190/24:192-24:199/24:201-24:207:02/24:209-24:210/24:212-24:236/24:238-24:272:02/24:274-24:289/24:291-24:308/24:311-24:325/24:327-24:341/24:343:01w/24:343:02-24:358/24:360-24:369/24:371-24:388N/24:390-24:391/24:393-24:414/24:415w/24:416-24:427N/24:428Nw/24:429N-24:470/24:472-24:488/24:490-24:498/24:500-24:505/24:507-24:521/24:522?/24:523-24:550/24:552-24:554/24:556N-24:561:02/24:563-24:600/24:602-24:605/24:606?/24:607-24:608N/24:610-24:615/24:616?/24:617-24:618/24:620-24:623N/24:625N-24:635/24:637-24:644/24:645?/24:646-24:662/24:664-24:672/24:674N-24:677, A*68:249	A2, -, A23(9), Null, A24(9), Low A24(9), A2403, A9, A24(9)/A3	470 bp
B1	B4	B7	B10	Mix 7	A*11:178/11:190, A*23:105/23:141, A*24:02:01:01-24:02:73/24:02:75-24:02:145/24:02:147-24:02:166/24:02:167?/24:02:168-24:02:177/24:02:178?/24:02:179-24:02:182/24:02:183?/24:02:184-24:03:06/24:05:01-24:05:02/24:07:01:01-24:11N/24:14:01:01-24:15/24:17:01:01-24:17:02/24:20:01:01-24:21:04/24:23/24:25-24:27/24:29-24:43/24:45N-24:64/24:66-24:86N/24:88/24:90:01N-24:93/24:95-24:106/24:108/24:110-24:128/24:130-24:137/24:139-24:166/24:168-24:187/24:189-24:203/24:205-24:206/24:208:01-24:210/24:212/24:214-24:226:02/24:229-24:284/24:286-24:288/24:291-24:298/24:300-24:314/24:316-24:338/24:340-24:354/24:356-24:372/24:374-24:376/24:377w/24:378Q/24:380/24:382-24:391/24:393-24:404/24:407-24:423/24:425N-24:445N/24:447Q-24:452:01/24:452:02?/24:453-24:470/24:472-24:477/24:479Q-24:514N/24:516-24:555/24:556N?/24:557-24:559/24:560?/24:561:01-24:568N/24:570-24:571/24:573-24:598/24:600-24:609/24:611-24:643/24:644?/24:645-24:651N/24:652?/24:653-24:671/24:674N-24:677, A*25:04/25:44, A*32:02/32:22, B*51:55, B*57:129	-, A24(9), Low A24(9), A2403, A9, Null, A32(19)	510 bp

Position				Mix	Allele	Serology	Size
A1	A4	A7	A10	Mix 8	A*02:06:31/02:52/02:135/02:309/02:454/02:614:02/02:992, A*25:01:01:01-25:01:01:12/25:01:02w/25:01:03-25:01:08/25:01:10-25:01:16/25:01:18-25:10/25:11w/25:12N-25:23/25:25-25:32/25:34-25:42N/25:44-25:58/25:60-25:74/25:75w/25:76:01-25:80/25:83-25:100, A*30:01:01:01-30:02:31/30:02:33-30:04:01:03/30:04:03-30:04:05/30:06-30:12:01/30:13-30:20/30:22-30:25/30:27N-30:81/30:83/30:85-30:89/30:91-30:95/30:97-30:123N/30:125-30:151/30:153-30:183/30:185-30:188/30:189?/30:190-30:205/30:206?/30:207-30:209N/30:210?/30:211-30:218/30:220Q-30:238/30:240N-30:251/30:252?/30:253-30:257, A*32:101Q, B*07:02:74w/07:225w/07:260w, B*15:16:06, B*57:148?, C*03:703?, C*04:01:49/04:229:02?, C*12:328, C*15:222	-, A25(10), Null, A30(19)	see below
					A*02:52/02:992, A*30:01:01:01-30:02:09/30:02:11-30:02:31/30:02:33-30:04:01:03/30:04:03-30:04:05/30:06-30:12:01/30:13-30:20/30:22-30:25/30:27N-30:81/30:83/30:85-30:89/30:91-30:95/30:97-30:123N/30:125-30:151/30:153-30:183/30:185-30:188/30:189?/30:190-30:205/30:206?/30:207-30:209N/30:210?/30:211-30:218/30:220Q-30:238/30:240N-30:251/30:252?/30:253-30:257, B*57:148?, C*03:703?, C*04:229:02?, C*12:328, C*15:222	-, A30(19), Null	550 bp
					A*02:06:31/02:135/02:309/02:454/02:614:02, A*30:02:10, B*15:16:06, C*04:01:49	-	560 bp
					A*32:101Q, B*07:225w/07:260w	-	395 bp
					A*25:01:01:01-25:01:01:12/25:01:02w/25:01:03-25:01:08/25:01:10-25:01:16/25:01:18-25:10/25:11w/25:12N-25:23/25:25-25:32/25:34-25:42N/25:44-25:58/25:60-25:74/25:75w/25:76:01-25:80/25:83-25:100, B*07:02:74w	A25(10), -, Null	405 bp
H2	H5	H8	H11	Mix 9	A*02:06:31/02:135/02:309/02:454/02:614:02, A*25:01:01:01-25:01:07/25:01:08w/25:01:10-25:01:16/25:01:18-25:13/25:15-25:38/25:39w/25:40-25:42N/25:44-25:58/25:60-25:76:02/25:78-25:80/25:83-25:88/25:90-25:100, A*26:01:01:01-26:01:26/26:01:28-26:01:37/26:01:38w/26:01:39-26:01:58/26:01:60-26:01:64/26:01:66-26:01:78/26:01:79?/26:01:80-26:01:85/26:01:86?/26:01:87/26:01:88?/26:01:89-26:03:01:02/26:03:03-26:18/26:20:01-26:30/26:31w/26:32-26:43:02/26:45-26:59:02/26:61-26:71N/26:73-26:75/26:76w/26:77-26:83/26:86-26:124/26:126-26:130/26:132-26:142/26:143w/26:145N-26:169/26:170w/26:171-26:183/26:185-26:203/26:205-26:233/26:234?/26:235-26:237/26:238?/26:239-26:263/26:264?/26:265-26:266N, A*34:01:01:01-34:02:07/34:03-34:11/34:13-34:18/34:20-34:22/34:23w-34:24w/34:25-34:35, A*66:01:01:01-66:22/66:24-66:29/66:31-66:40/66:41w/66:42-66:54/66:55?/66:56, A*68:294, B*07:02:74, B*18:02:02, B*38:02:04	-, A25(10), Null, A26(10), A10, A34(10), A66(10)	see below
					A*02:06:31/02:135/02:309/02:454/02:614:02, A*25:46/25:83, A*26:07:01-26:07:02/26:92, A*66:42	-, A26(10)	450 bp
					A*25:01:01:01-25:01:07/25:01:08w/25:01:10-25:01:16/25:01:18-25:13/25:15-25:38/25:39w/25:40-25:42N/25:44-25:45/25:47-25:58/25:60-25:76:02/25:78-25:80/25:84-25:88/25:90-25:100, A*26:01:01:01-26:01:26/26:01:28-26:01:37/26:01:38w/26:01:39-26:01:58/26:01:60-26:01:64/26:01:66-26:01:78/26:01:79?/26:01:80-26:01:85/26:01:86?/26:01:87/26:01:88?/26:01:89-26:03:01:02/26:03:03-26:06/26:08:01:01-26:18/26:20:01-26:30/26:31w/26:32-26:43:02/26:45-26:59:02/26:61-26:71N/26:73-26:75/26:76w/26:77-26:83/26:86-26:91/26:93-26:124/26:126-26:130/26:132-26:142/26:143w/26:145N-26:169/26:170w/26:171-26:183/26:185-26:203/26:205-26:233/26:234?/26:235-26:237/26:238?/26:239-26:263/26:264?/26:265-26:266N, A*34:01:01:01-34:02:07/34:03-34:11/34:13-34:18/34:20-34:22/34:23w-34:24w/34:25-34:35, A*66:01:01:01-66:22/66:24-66:29/66:31-66:40/66:41w/66:43-66:54/66:55?/66:56, A*68:294, B*07:02:74, B*18:02:02, B*38:02:04	A25(10), -, Null, A26(10), A10, A34(10), A66(10)	445 bp

Position				Mix	Allele	Serology	Size
G2	G5	G8	G11	Mix10	A*01:01:56/01:483, A*02:06:31/02:135/02:309/02:454/02:614:02, A*24:02:185/24:609, A*25:11/25:81?-25:82?, A*26:01:01:01-26:01:01:60/26:01:03-26:01:12/26:01:14-26:01:58/26:01:60-26:01:62/26:01:64/26:01:66-26:01:78/26:01:79?/26:01:80-26:01:85/26:01:86?/26:01:87/26:01:88?-26:01:89?/26:01:90-26:03:01:02/26:03:03-26:32/26:34-26:43:02/26:45-26:59:02/26:61-26:84/26:86-26:109/26:111-26:124/26:126-26:130/26:132-26:142/26:143w/26:145N-26:203/26:205-26:224/26:225?/26:226/26:228-26:233/26:234?/26:235-26:259/26:261-26:263/26:264?/26:265-26:266N, A*30:02:10, A*43:01-43:03	-, A26(10), Null, A10, A43	see below
					A*02:06:31/02:135/02:309/02:454/02:614:02, A*25:11, A*26:03:01:01-26:03:01:02/26:03:03-26:03:05/26:06/26:21/26:30/26:36/26:78/26:92/26:111/26:146/26:177/26:193/26:229/26:257	-, A26(10)	415 bp
					A*01:01:56/01:483, A*24:02:185/24:609, A*25:81?-25:82?, A*26:01:01:01-26:01:01:60/26:01:03-26:01:12/26:01:14-26:01:58/26:01:60-26:01:62/26:01:64/26:01:66-26:01:78/26:01:79?/26:01:80-26:01:85/26:01:86?/26:01:87/26:01:88?-26:01:89?/26:01:90-26:02:02/26:04-26:05/26:07:01-26:20:02/26:22-26:29/26:31-26:32/26:34-26:35/26:37-26:43:02/26:45-26:59:02/26:61-26:77/26:79-26:84/26:86-26:91/26:93-26:109/26:112:01-26:124/26:126-26:130/26:132-26:142/26:143w/26:145N/26:147-26:176/26:178-26:192/26:194-26:203/26:205-26:224/26:225?/26:226/26:228/26:230N-26:233/26:234?/26:235-26:256/26:258-26:259/26:261-26:263/26:264?/26:265-26:266N, A*30:02:10, A*43:01-43:03	-, A26(10), Null, A10, A43	405 bp
F2	F5	F8	F11	Mix11	A*02:741/02:1158?/02:1165?/02:1172?, A*26:48/26:69, A*33:183, A*34:01:01:01-34:01:08/34:05/34:11-34:12/34:14/34:16-34:18/34:23/34:27/34:31/34:34	-, A34(10)	580 bp
E2	E5	E8	E11	Mix12	A*03:103:01-03:103:02/03:282, A*11:116/11:140/11:372, A*25:02/25:75, A*26:13/26:19/26:33/26:226, A*29:32, A*31:89/31:115, A*32:17, A*33:125/33:131/33:288, A*34:01:01:01-34:01:08/34:05-34:06/34:11-34:12/34:14/34:16-34:19/34:23/34:27/34:31/34:34, A*66:01:01:01-66:02:01:03/66:04/66:06-66:14/66:16-66:27N/66:29-66:38/66:40-66:56, A*68:262/68:294, A*74:13/74:42	-, A25(10), A34(10), A66(10), Null	415 bp
D2	D5	D8	D11	Mix13	A*01:51, A*03:24, A*11:10, A*25:43, A*30:163, A*33:49/33:144, A*34:02:01:01-34:04/34:07-34:10N/34:13/34:15/34:20-34:22/34:25-34:26N/34:28?/34:29N-34:30N/34:32-34:33/34:35, A*68:103:01-68:103:02, A*69:01:05, B*35:08:14w/35:14:03w	-, A3, A11, A34(10), Null	385 bp
C2	C5	C8	C11	Mix14	A*02:12-02:13/02:19/02:27/02:37-02:38/02:44/02:49:01/02:54/02:142/02:226N/02:271/02:280/02:417/02:543/02:630/02:662/02:682-02:683/02:723/02:804/02:840/02:948/02:1094/02:1156, A*03:02:01:01w-03:02:09w/03:10/03:31w-03:32w/03:65w/03:69Nw/03:73w/03:76w/03:82w/03:90w/03:106w/03:113w/03:160w/03:167/03:198w/03:218w/03:223w/03:225/03:236w-03:237w/03:242w/03:244w/03:253w/03:274w-03:275Nw/03:281w/03:285w/03:309w/03:314w/03:318w-03:319w/03:333w/03:348w/03:356w/03:385w/03:453w/03:458Qw/03:466w/03:473w/03:477w/03:496w/03:502w/03:531w, A*11:01:01:01-11:01:34/11:01:36-11:01:56/11:01:58-11:01:103/11:01:104w/11:01:105-11:16/11:18-11:22/11:23w/11:26-11:27/11:29-11:30/11:32:01-11:34/11:36-11:39/11:41-11:44/11:46-11:49/11:51-11:52Q/11:54:01-11:77/11:79-11:93/11:95-11:97/11:98w/11:99N-11:110/11:113-11:129/11:130w/11:131-11:157/11:159-11:175/11:177/11:179-11:182Q/11:184-11:189/11:192-11:210N/11:212-11:222/11:224-11:225/11:227-11:228/11:229w/11:230-11:249/11:250w/11:251N-11:257/11:258w/11:259-11:268/11:270/11:272Q-11:289/11:291-11:309/11:311-11:325/11:327-11:345/11:346w/11:347N-11:371/11:373-11:379/11:381-11:388N/11:389?/11:390-11:391/11:392?/11:393-11:395/11:396?-11:397N?/11:398-11:431/11:432N?/11:433N-11:434/11:435?/11:436N-11:449/11:450?/11:451-11:503/11:505/11:507-11:512, A*24:19/24:28/24:44/24:89/24:290/24:379/24:406/24:424/24:652/24:672?, A*30:164, A*31:24w/31:97w/31:136w, A*33:19w/33:59w/33:102w/33:150w/33:177w/33:190w, A*66:19, A*68:09/68:26/68:28/68:129/68:134/68:171:02N/68:204, A*69:03	A2, -, Null, A3, A11, A9, A24(9), A28	520 bp

Position				Mix	Allele	Serology	Size
B2	B5	B8	B11	Mix15	A*03:01:39/03:02:08, A*29:01:01:01-29:01:06/29:01:08-29:02:35/29:02:37-29:02:39/29:02:40?/29:02:41-29:59/29:61-29:110/29:111w/29:112N-29:178/29:179?/29:180-29:208, A*32:30:01-32:30:02/32:32, A*68:01:28/68:01:36/68:130:02, A*74:10/74:41-74:42/74:46	-, A29(19), Null	see below
					A*29:01:01:01-29:01:06/29:01:08-29:02:35/29:02:37-29:02:39/29:02:40?/29:02:41-29:12/29:14-29:18/29:20-29:38/29:40-29:47/29:49-29:59/29:61-29:97/29:99-29:110/29:111w/29:112N-29:158/29:160-29:171/29:173-29:178/29:179?/29:180-29:183/29:185-29:208, A*74:10/74:41-74:42/74:46	A29(19), Null, -	160 bp
					A*03:01:39/03:02:08, A*29:01:01:01-29:01:06/29:01:08/29:01:10-29:02:35/29:02:37-29:02:39/29:02:40?/29:02:41-29:31/29:33-29:59/29:61-29:110/29:111w/29:112N-29:178/29:179?/29:180-29:208, A*32:30:01-32:30:02/32:32, A*68:01:28/68:01:36/68:130:02	-, A29(19), Null	515 bp
A2	A5	A8	A11	Mix16	A*30:01:01:01-30:01:07/30:01:08w/30:01:09-30:02:09/30:02:11-30:04:05/30:06-30:11:02/30:13-30:17/30:19-30:20/30:22-30:25/30:27N-30:40/30:42-30:54/30:56-30:81/30:83/30:85-30:151/30:153-30:165/30:167-30:183/30:185-30:188/30:189?/30:190-30:205/30:206?/30:207-30:208N/30:210?/30:211-30:238/30:240N-30:251/30:252?/30:253-30:257	A30(19), -, Null	570 bp
H3	H6	H9	H12	Mix17	A*29:14, A*30:152, A*31:01:02:01-31:01:06/31:01:08-31:01:46/31:01:47?/31:01:48-31:07/31:09-31:20/31:23-31:44:01/31:45-31:74/31:76-31:88/31:91-31:103/31:104w/31:105-31:108/31:110-31:201N/31:202N?/31:203/31:204?/31:205-31:209/31:211-31:233/31:235-31:240/31:241N?/31:242-31:247, A*33:249?	-, A31(19), Null	185 bp
G3	G6	G9	G12	Mix18	A*02:829, A*03:152/03:219, A*23:03:01/23:83, A*24:18/24:21:03/24:204/24:208:01/24:213/24:673, A*29:13, A*31:07-31:08/31:10/31:222/31:234, A*32:01:01:01-32:01:06/32:01:08-32:01:11/32:01:13-32:01:47/32:01:49-32:27N/32:28:02?/32:29-32:30:01/32:31-32:33:01/32:33:03/32:35-32:65:02/32:67-32:70/32:72-32:74/32:75w/32:76-32:93/32:94w/32:95-32:100/32:102-32:157/32:159-32:184/32:186-32:202	-, A24(9)/A3, A31(19), A32(19), Null	see below
					A*02:829, A*23:03:01/23:83, A*24:21:03/24:208:01, A*29:13, A*31:07-31:08/31:10/31:222/31:234, A*32:01:01:01-32:01:06/32:01:08-32:01:11/32:01:13-32:01:47/32:01:49-32:03:01:02/32:05-32:27N/32:28:02?/32:29-32:30:01/32:31-32:33:01/32:33:03/32:35-32:65:02/32:67-32:70/32:72-32:74/32:75w/32:76-32:93/32:94w/32:95-32:100/32:102-32:157/32:159-32:184/32:186-32:202	-, A31(19), A32(19), Null	410 bp
					A*03:152/03:219, A*24:18/24:204/24:213/24:673, A*32:04/32:52:01	-, A24(9)/A3	520 bp

Position				Mix	Allele	Serology	Size
F3	F6	F9	F12	Mix19	A*02:24:02/02:65/02:152/02:507, A*29:48/29:105/29:164, A*32:15/32:93, A*33:01:01:01-33:01:04/33:01:06-33:01:22/33:03:01:01-33:03:25/33:03:26w/33:03:28-33:03:30/33:03:31w/33:03:32-33:03:55/33:03:56?/33:03:57/33:03:59-33:18:01/33:20/33:22-33:29/33:31/33:33:01-33:34/33:36-33:37/33:39-33:52/33:54-33:65/33:66w/33:67-33:80N/33:82-33:88/33:90-33:121/33:123N-33:129N/33:131-33:134/33:136-33:139/33:140Nw/33:141-33:151/33:153-33:157N/33:158w/33:160-33:174N/33:176N-33:187/33:188w/33:189-33:214/33:215?/33:216-33:248N/33:249?/33:250-33:281/33:283-33:296, A*68:319, A*74:04/74:21/74:43, B*07:02:40, B*08:01:07, B*15:02:07, B*55:02:10	-, A2/19, A33(19), A19, Null, B8	see below
					A*02:24:02/02:65/02:152/02:507, A*29:48, A*32:93, A*33:08-33:09, A*74:04/74:21/74:43	-, A2/19, A33(19), A19	475 bp
					A*29:105/29:164, A*32:15, A*33:01:01:01-33:01:04/33:01:06-33:01:22/33:03:01:01-33:03:25/33:03:26w/33:03:28-33:03:30/33:03:31w/33:03:32-33:03:55/33:03:56?/33:03:57/33:03:59-33:07/33:10-33:18:01/33:20/33:22-33:29/33:31/33:33:01-33:34/33:36-33:37/33:39-33:52/33:54-33:65/33:66w/33:67-33:80N/33:82-33:88/33:90-33:121/33:123N-33:129N/33:131-33:134/33:136-33:139/33:140Nw/33:141-33:151/33:153-33:157N/33:158w/33:160-33:174N/33:176N-33:187/33:188w/33:189-33:214/33:215?/33:216-33:248N/33:249?/33:250-33:281/33:283-33:296, A*68:319, B*07:02:40, B*08:01:07, B*15:02:07, B*55:02:10	-, A33(19), Null, B8	470 bp
E3	E6	E9	E12	Mix20	A*02:01:165, A*03:01:39/03:02:08, A*29:19/29:39/29:48/29:159, A*68:01:28/68:01:36/68:130:02, A*74:01:01:01-74:01:09/74:01:10?/74:01:11-74:09/74:11-74:15/74:16:02-74:40/74:43-74:45/74:47N/74:49-74:53	-, A74(19), Null	160 bp
D3	D6	D9	D12	Mix21	A*02:01:09/02:05:05/02:06:07/02:06:35/02:07:12/02:11:02/02:35:03/02:50/02:76:02-02:76:03/02:122/02:243:02-02:243:03/02:528:02/02:570:01/02:591:01, A*03:171/03:271/03:373/03:428/03:442, A*11:57/11:158/11:359, A*24:94/24:138/24:188/24:228/24:293/24:515/24:610/24:621, A*29:51/29:69/29:73, A*32:109, A*33:252, A*68:01:01:01-68:01:10/68:01:12-68:01:24/68:01:26-68:01:66/68:01:67?/68:01:68-68:02:06/68:02:08-68:47/68:51-68:128/68:130:01-68:136/68:138-68:183/68:185-68:217/68:219-68:229/68:231-68:233/68:235/68:237-68:250/68:252-68:257/68:258?/68:259-68:285/68:287-68:292N/68:294-68:310/68:311?/68:312-68:329:02/68:331-68:342, A*69:01:01:01-69:06/69:08-69:09, B*40:577?/40:602, B*44:497	A2, -, A68(28), A28, Null, A69(28)	645 bp
C3	C6	C9	C12	Mix22	A*02:34-02:35:03/02:56:01-02:56:02/02:62/02:78/02:103/02:741/02:907/02:1095/02:1171?/02:1258, A*03:241/03:343, A*68:308, A*69:01:01:01-69:09, C*07:1034?	A2, -, A69(28)	390 bp

Position				Mix	Allele	Serology	Size
B3	B6	B9	B12	Mix23	A*02:01:01:01-02:01:07/02:01:10-02:01:11/02:01:12w/02:01:13-02:01:15/02:01:17-02:01:19/02:01:21-02:01:32/02:01:33w/02:01:34-02:01:39/02:01:41-02:01:81/02:01:83-02:01:227/02:01:228?/02:01:229-02:03:10/02:03:12Q-02:05:04/02:05:06-02:06:06/02:06:08-02:06:34/02:07:01:01-02:07:11/02:07:13-02:11:01:08/02:11:03-02:22:02/02:24:01-02:35:01/02:35:02w/02:36-02:42:01/02:43N-02:76:01/02:76:04-02:77/02:79:01-02:97:02/02:99:01-02:99:02/02:101:01-02:121/02:123-02:140:02/02:142-02:243:01/02:244-02:311/02:313-02:469/02:471-02:528:01/02:529-02:569/02:571-02:590/02:591:02-02:635/02:636w/02:637-02:643N/02:645-02:673/02:674w/02:675N-02:740/02:741w/02:742-02:795Q/02:797N-02:802/02:804-02:814/02:815w/02:816-02:828/02:830:01-02:958/02:959?/02:960-02:967/02:968?/02:969-02:981/02:982?/02:983-02:1009/02:1010?/02:1011Q-02:1096/02:1097?/02:1098-02:1106/02:1107N?/02:1108-02:1117/02:1118?/02:1119N-02:1152/02:1153N?/02:1154-02:1163:02/02:1164w/02:1165-02:1199/02:1200?/02:1201-02:1232/02:1233?/02:1234-02:1248/02:1249?/02:1250Q-02:1270, A*03:89:01, A*24:02:06/24:340, A*30:07w/30:13w/30:16w/30:22w/30:44w/30:46w, B*07:02:80w, B*35:01:60w, B*51:01:34w, B*58:01:24, C*06:247w, C*07:02:27w/07:577w	A2, Low A2, -, A203, A210, Null, A2/19, A24(9)	see below
					A*02:556, B*51:01:34w	-	175 bp
					A*02:50/02:556	A2, -	205 bp
					A*02:50/02:556	A2, -	225 bp
					A*02:01:01:01-02:01:07/02:01:10-02:01:11/02:01:12w/02:01:13-02:01:15/02:01:18-02:01:19/02:01:21-02:01:32/02:01:33w/02:01:34-02:01:39/02:01:41-02:01:50/02:01:53-02:01:62/02:01:64-02:01:73/02:01:75-02:01:76/02:01:78-02:01:81/02:01:83-02:01:113/02:01:115-02:01:152/02:01:154-02:01:227/02:01:228?/02:01:229-02:03:10/02:03:12Q-02:05:02/02:05:04/02:05:06-02:06:06/02:06:08-02:06:11/02:06:13/02:06:15-02:06:19/02:06:21-02:06:34/02:07:01:01-02:07:11/02:07:13-02:07:14/02:07:16/02:07:18-02:11:01:08/02:11:03/02:11:05-02:11:08/02:11:10-02:22:01:02/02:24:01-02:35:01/02:36-02:42:01/02:43N-02:44/02:47/02:49:01-02:49:02/02:51-02:54/02:57-02:60:02/02:62-02:76:01/02:77/02:79:01-02:91/02:93:01-02:97:02/02:99:01-02:99:02/02:101:01-02:102/02:104-02:112/02:114-02:121/02:123-02:128/02:130-02:140:02/02:142/02:145-02:168/02:170-02:175/02:177-02:184/02:186-02:194/02:196-02:200/02:202:01-02:204/02:207-02:216/02:218-02:243:01/02:244-02:248/02:250N-02:311/02:313-02:314:02N/02:316-02:320/02:322-02:357/02:359-02:368/02:370-02:371/02:373N-02:377/02:379-02:409/02:411-02:418/02:420-02:469/02:471-02:481/02:483-02:503/02:505-02:513/02:515-02:528:01/02:529-02:543/02:545-02:569/02:572-02:590/02:591:02-02:600/02:602-02:635/02:636w/02:637-02:643N/02:645-02:673/02:674w/02:675N-02:696:02N/02:698-02:740/02:741w/02:742-02:745/02:747-02:765/02:767-02:795Q/02:797N-02:802/02:804-02:814/02:815w/02:816-02:828/02:830:01-02:872/02:874-02:880N/02:882-02:958/02:959?/02:960-02:967/02:968?/02:969-02:981/02:982?/02:983-02:1009/02:1010?/02:1011Q-02:1021/02:1023-02:1026:02/02:1029-02:1030:02/02:1032-02:1096/02:1097?/02:1098-02:1106/02:1107N?/02:1108-02:1117/02:1118?/02:1119N-02:1152/02:1153N?/02:1154-02:1163:02/02:1164w/02:1165-02:1199/02:1200?/02:1201-02:1232/02:1233?/02:1234-02:1248/02:1249?/02:1250Q-02:1270, A*03:89:01, A*30:22w, B*07:02:80w, B*35:01:60w, B*51:01:34w, B*58:01:24, C*07:02:27w/07:577w	A2, Low A2, -, A203, A210, Null, A2/19	135 bp

Position				Mix	Allele	Serology	Size
					A*02:01:01:01-02:01:07/02:01:10-02:01:11/02:01:12w/02:01:13-02:01:15/02:01:17-02:01:19/02:01:21-02:01:30/02:01:32/02:01:33w/02:01:34-02:01:39/02:01:41-02:01:66/02:01:68-02:01:81/02:01:83-02:01:121/02:01:123-02:01:126/02:01:128-02:01:227/02:01:228?/02:01:229-02:03:10/02:03:12Q-02:05:04/02:05:06-02:06:06/02:06:08-02:06:34/02:07:01:01-02:07:05/02:07:07-02:07:11/02:07:13-02:07:27/02:09:01:01-02:11:01:08/02:11:03-02:19/02:21-02:22:02/02:24:01-02:33/02:35:02w/02:36-02:42:01/02:43N-02:49:02/02:51-02:54/02:57-02:61/02:63-02:76:01/02:76:04-02:77/02:79:01-02:97:02/02:99:01-02:99:02/02:101:01-02:102/02:104-02:121/02:123-02:127/02:129-02:138/02:140:01-02:140:02/02:142-02:157:02/02:159-02:168/02:170-02:194/02:196-02:207/02:210-02:243:01/02:244-02:249/02:251-02:257/02:259-02:271/02:273-02:291/02:293Q-02:311/02:313-02:316/02:318-02:350N/02:352-02:385/02:387-02:414/02:416-02:469/02:472-02:492/02:494-02:528:01/02:529-02:569/02:571-02:579/02:581Q-02:584/02:586-02:590/02:591:02-02:608N/02:610:01-02:633/02:635/02:636w/02:637-02:643N/02:645-02:662/02:664-02:673/02:674w/02:675N-02:676/02:678-02:701/02:703-02:737/02:739-02:740/02:742-02:786/02:788N-02:795Q/02:797N-02:802/02:804/02:806N-02:814/02:816-02:828/02:830:01-02:853/02:855-02:906/02:908-02:944/02:946N-02:957/02:959?/02:960-02:967/02:968?/02:969-02:981/02:982?/02:983-02:1000/02:1002-02:1009/02:1010?/02:1011Q-02:1021/02:1023-02:1027/02:1029-02:1094/02:1096/02:1097?/02:1098-02:1106/02:1107N?/02:1108-02:1109/02:1111-02:1117/02:1118?/02:1119N-02:1134/02:1136-02:1147/02:1149-02:1152/02:1153N?/02:1154-02:1155/02:1157-02:1163:02/02:1164w/02:1165-02:1170/02:1172-02:1199/02:1200?/02:1201-02:1232/02:1233?/02:1234/02:1236-02:1241/02:1243-02:1248/02:1249?/02:1250Q-02:1257/02:1259-02:1270, A*03:89:01, A*24:02:06/24:340, A*30:07w/30:22w	A2, Low A2, -, A203, A210, Null, A2/19, A24(9)	165 bp
					A*02:01:01:01-02:01:02:02/02:01:04-02:01:07/02:01:10-02:01:11/02:01:12w/02:01:13-02:01:15/02:01:17-02:01:19/02:01:21-02:01:32/02:01:33w/02:01:34-02:01:39/02:01:41-02:01:48/02:01:50-02:01:81/02:01:83-02:01:107/02:01:109-02:01:154/02:01:156-02:01:227/02:01:228?/02:01:229-02:03:10/02:03:12Q-02:05:04/02:05:06-02:05:12/02:05:14-02:06:01:17/02:06:03-02:06:06/02:06:08-02:06:34/02:07:01:01-02:07:11/02:07:13-02:10/02:12-02:22:02/02:24:01-02:34/02:36-02:42:01/02:43N-02:47/02:49:01-02:49:02/02:51-02:68/02:70-02:76:01/02:76:04-02:77/02:79:01-02:80/02:82N-02:86:02/02:88N-02:89:02/02:91-02:97:02/02:99:01-02:99:02/02:101:01-02:111/02:113:01N-02:115/02:117-02:121/02:123/02:125N-02:127/02:130-02:135/02:137-02:140:02/02:142-02:145/02:147-02:183/02:185-02:243:01/02:244-02:246/02:248-02:260/02:262-02:296:02/02:299-02:307/02:309-02:311/02:313-02:330/02:332-02:365/02:367-02:380/02:382-02:393/02:395N-02:442/02:444-02:456/02:458-02:469/02:471-02:489/02:491-02:493/02:495-02:496/02:498-02:502/02:504-02:513/02:516N-02:528:01/02:529-02:533/02:535-02:569/02:572-02:576/02:578/02:581Q-02:583/02:585-02:588/02:590/02:591:02-02:626/02:628-02:635/02:636w/02:637-02:643N/02:646-02:673/02:674w/02:675N-02:700/02:702-02:704/02:706-02:713/02:715N-02:731/02:733-02:737/02:739-02:740/02:742-02:746/02:748N/02:750/02:752-02:753/02:755-02:756/02:758-02:772/02:774-02:795Q/02:797N-02:802/02:804-02:807N/02:809-02:814/02:816-02:820/02:822-02:828/02:830:01-02:892/02:894-02:905/02:908-02:922/02:924-02:925/02:927-02:931/02:933/02:935-02:939/02:942-02:958/02:960-02:963/02:965-02:967/02:968?/02:969-02:981/02:982?/02:983-02:985/02:987-02:990/02:992-02:995/02:997Q-02:1009/02:1010?/02:1011Q-02:1030:02/02:1033-02:1094/02:1096/02:1097?/02:1098-02:1099/02:1101-02:1106/02:1107N?/02:1109-02:1111/02:1113-02:1117/02:1118?/02:1119N-02:1125/02:1127-02:1128/02:1130-02:1142/02:1144-02:1152/02:1153N?/02:1154-02:1159/02:1161-02:1163:02/02:1164w/02:1165-02:1175/02:1177N-02:1181/02:1183/02:1185N-02:1199/02:1200?/02:1201-02:1225/02:1227-02:1232/02:1233?/02:1234-02:1241/02:1243-02:1248/02:1249?/02:1250Q-02:1257/02:1259-02:1261/02:1263-02:1267/02:1269-02:1270, A*03:89:01, A*30:13w/30:16w/30:44w/30:46w, C*06:247w	A2, Low A2, -, A203, A210, Null, A2/19	190 bp

Position				Mix	Allele	Serology	Size
A3	A6	A9	A12	Mix24	A*43:01-43:03, A*80:01:01:01-80:01:02/80:03/80:05-80:10	A43, Null, -, A80	see below
					A*80:01:01:01-80:01:02/80:03/80:05-80:10	A80, -, Null	170 bp
					A*43:01-43:03	A43, Null, -	445 bp

Amplification control (internal positive control): 90 base pairs (bp)

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)

Table 2: Amplification patterns for all **HLA-A*** alleles detected by the HLA-A* CTS-PCR-SSP reagents (**Lot-No A18-0**) based on IMGT/HLA Sequence Database Release 3.63.0, January 2026

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	24
A*01:01:01:01:01:01:55/01:01:57-01:01:64/01:01:67-01:01:130/01:01:132-01:01:145/01:01:147-01:01:159/01:01:161-01:04:01:02N/01:06-01:12/01:14-01:33/01:35-01:37:01:02/01:39-01:50/01:52:01N-01:71/01:73-01:101/01:103-01:138/01:140-01:01:166/01:168-01:175/01:177-01:193/01:195-01:199/01:201-01:220/01:222-01:243/01:245-01:266:02/01:268-01:283/01:285N-01:379N/01:381-01:389/01:391-01:398/01:400N-01:417N/01:419-01:426/01:428-01:449/01:451N-01:463/01:465/01:467-01:482/01:484-01:485/01:487-01:488N/01:490-01:501, A*11:94/11:271/11:326, A*23:128, A*25:59, B*07:64, B*15:12:01-15:12:03/15:19/15:270/15:298/15:304N/15:649/15:679/15:716/15:730	A1, Null, -, B76(15)	1																							
A*01:01:56/01:483	-	1									10														
A*01:01:131/01:01:160/01:399/01:486, C*04:534	-	?																							
A*01:13/01:176/01:194	-	1			4																				
A*01:51	-	1												13											
A*01:200/01:244/01:380:01:01-01:380:01:02/01:464, A*11:17, A*36:01:01:01-36:01:02/36:03-36:16N	-, A36, Null		2																						
A*01:267	-	w																							
A*01:427/01:466, A*03:107/03:164/03:413, A*36:02	-		2		4																				
A*01:489	-	1			?																				

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	24
A*02:01:01:01-02:01:07/02:01:10-02:01:11/02:01:13-02:01:15/02:01:18-02:01:19/02:01:21-02:01:25/02:01:27-02:01:32/02:01:34-02:01:39/02:01:41-02:01:51/02:01:53-02:01:63/02:01:66-02:01:68/02:01:70-02:01:73/02:01:76-02:01:80/02:01:83-02:01:94/02:01:96-02:01:164/02:01:166-02:01:227/02:01:229-02:03:06/02:03:08-02:03:10/02:03:12Q-02:03:14/02:03:16-02:05:02/02:05:04/02:05:06-02:05:08/02:05:10-02:06:06/02:06:08-02:06:11/02:06:13-02:06:18/02:06:20-02:06:30/02:06:32-02:06:34/02:07:01:01-02:07:11/02:07:13-02:07:14/02:07:16-02:08:01/02:09:01:01-02:11:01:08/02:11:03-02:11:14/02:14-02:18/02:20:01-02:22:02/02:24:01/02:25-02:26/02:28-02:33/02:36/02:39-02:42:01/02:43N/02:45/02:47/02:49:02/02:51/02:53:01N-02:53:02N/02:55:02/02:57-02:59/02:61/02:63/02:66-02:69/02:71/02:73-02:76:01/02:77/02:79:01-02:79:02/02:81-02:87/02:89:01-02:97:02/02:99:01-02:99:02/02:101:01-02:102/02:104/02:106-02:113:02N/02:115-02:116/02:118/02:120-02:121/02:123-02:128/02:130-02:134/02:136-02:140:02/02:143-02:151/02:153:01-02:168/02:170-02:177/02:179-02:184/02:186-02:187/02:189-02:192/02:194/02:195:02-02:222N/02:224-02:225N/02:227N-02:228/02:230-02:236/02:238-02:243:01/02:244-02:245/02:247-02:253/02:255-02:270/02:272-02:274/02:276-02:278/02:281-02:285/02:287/02:289:01/02:290-02:297/02:299-02:300/02:302-02:303/02:305N-02:307/02:310/02:313-02:338/02:340-02:347/02:349-02:376/02:378-02:382/02:384-02:405/02:407-02:411/02:413-02:416/02:418-02:453/02:455-02:469/02:471-02:487/02:489-02:490N/02:492-02:503/02:505-02:506N/02:508-02:509/02:511-02:526/02:528:01/02:529-02:542/02:544-02:569/02:572-02:579/02:581Q/02:583-02:590/02:591:02-02:593/02:595-02:600/02:602-02:608N/02:610:01-02:614:01/02:615-02:621/02:623-02:629/02:631-02:635/02:637-02:640/02:642/02:645-02:648:02/02:650-02:661/02:663-02:673/02:675N/02:677/02:679-02:680/02:684-02:710N/02:712-02:722/02:724-02:740/02:742-02:780/02:782-02:788N/02:790-02:795Q/02:797N-02:802/02:805Q-02:808/02:810-02:814/02:816-02:825/02:827Q/02:830:01-02:830:02/02:832N-02:839/02:841-02:871N/02:873-02:875/02:877-02:906/02:908-02:922/02:924-02:926/02:928-02:943/02:945N-02:947:02/02:949-02:958/02:960-02:967/02:969-02:981/02:983-02:984/02:986-02:991/02:993:01-02:1009/02:1011Q-02:1020/02:1024-02:1027/02:1030:02-02:1032/02:1034-02:1045Q/02:1047-02:1049/02:1051-02:1086/02:1088-02:1093/02:1096/02:1098-02:1104N/02:1106/02:1108-02:1109/02:1111-02:1117/02:1119N-02:1144/02:1146-02:1152/02:1154-02:1155/02:1157/02:1159-02:1163:02/02:1166-02:1170/02:1173-02:1199/02:1201-02:1202/02:1204-02:1232/02:1234-02:1235/02:1237-02:1248/02:1250Q-02:1257/02:1260-02:1263/02:1265-02:1270	A2, Low A2, -, A203, A210, Null			3																			23		

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	24
A*02:01:09/02:05:05/02:06:07/02:06:35/02:07:12/02:11:02/02:76:02-02:76:03/02:243:02-02:243:03/02:528:02/02:570:01	A2, -			3																	21				
A*02:01:12/02:01:33/02:636/02:674/02:815/02:1164, B*07:02:80	A2, -			3																			w		
A*02:01:17/02:01:26/02:01:52/02:01:64/02:01:69/02:01:74/02:01:81/02:01:95/02:03:07/02:05:03/02:06:12/02:06:19/02:07:15/02:08:02/02:55:01/02:64:01-02:64:02/02:72/02:76:04/02:80/02:88N/02:105/02:114/02:117/02:119/02:169/02:178/02:185/02:188/02:195:01/02:223N/02:229/02:246/02:275/02:279/02:288/02:289:02/02:298/02:301N/02:304/02:339/02:348/02:377/02:383/02:406/02:412/02:491/02:504/02:510/02:527/02:582/02:601/02:622N/02:641/02:643N/02:676/02:678/02:681/02:781/02:789N/02:826Q/02:828/02:831N/02:872/02:876/02:923/02:944/02:985/02:1028-02:1030:01/02:1046/02:1203/02:1259, B*58:01:24	A2, -, Null																						23		
A*02:01:40/02:03:11/02:42:02/02:141/02:312/02:470/02:570:02/02:796N/02:803N, B*15:10:07	A2, -, Null			3																					
A*02:01:65/02:01:75/02:03:15/02:05:09/02:60:01:01-02:60:02/02:193/02:254/02:286/02:308/02:311/02:488/02:594/02:649/02:711	-			w																				23	
A*02:01:165	-			3																	20			23	
A*02:01:228/02:959/02:968/02:982/02:1010/02:1097/02:1107N/02:1118/02:1153N/02:1200/02:1233/02:1249	-, Null			3																				?	
A*02:06:31/02:614:02	-			?					8	9	10													23	
A*02:12-02:13/02:19/02:27/02:37-02:38/02:44/02:49:01/02:54/02:142/02:226N/02:271/02:280/02:417/02:543/02:630/02:682-02:683/02:723/02:804/02:840/02:948/02:1094/02:1156	A2, -, Null			3											14									23	
A*02:24:02/02:507	-			3																19				23	
A*02:34-02:35:01/02:56:01/02:62/02:907	A2, -			3	w																		22	23	
A*02:35:02	A2				w																		22	w	
A*02:35:03	A2			3	w																	21	22		
A*02:46/02:70/02:1050	A2, -			3			6																	23	
A*02:48/02:129/02:571	-						6																	23	
A*02:50	A2																					21		23	
A*02:52/02:992	-								8															23	
A*02:56:02/02:103	-				w																		22	23	
A*02:65/02:152	A2/19, -																			19				23	
A*02:78	A2			3																			22		

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	24	
A*02:122/02:591:01, A*11:158, A*68:01:01:01-68:01:10/68:01:12-68:01:24/68:01:26-68:01:27/68:01:29-68:01:35/68:01:37-68:01:66/68:01:68-68:02:06/68:02:08-68:08:02/68:10-68:25/68:27:01-68:27:02/68:29-68:47/68:51-68:70/68:72-68:102/68:104:01-68:128/68:130:01/68:131-68:133/68:135-68:136/68:138-68:171:01N/68:172-68:183/68:185-68:203N/68:205N-68:217/68:219-68:229/68:231-68:233/68:235/68:237-68:248/68:250/68:252-68:257/68:259-68:261/68:263Q-68:285/68:287-68:292N/68:295-68:307/68:309-68:310/68:312-68:318/68:320-68:329:02/68:331-68:342, B*40:602, B*44:497	-, A68(28), A28, Null																					21				
A*02:135/02:309/02:454	-								8	9	10														23	
A*02:237/02:580/02:809	-			3	w																				23	
A*02:609	-		w	3																					23	
A*02:662	-														14										23	
A*02:741	-			3	w							11											22	w		
A*02:829, A*32:01:01:01-32:01:06/32:01:08-32:01:11/32:01:13-32:01:47/32:01:49-32:01:66/32:03:01:01-32:03:01:02/32:05-32:12/32:14/32:16/32:18-32:21/32:23/32:25-32:27N/32:29/32:31/32:33:01/32:33:03/32:35-32:51/32:52:02-32:65:02/32:67-32:70/32:72-32:74/32:76-32:78/32:80-32:92N/32:95-32:100/32:102-32:108/32:110-32:157/32:159-32:169/32:171-32:184/32:186-32:202	-, A32(19), Null																		18							
A*02:927	-				w																				23	
A*02:1021/02:1023/02:1033/02:1087/02:1105/02:1110/02:1145/02:1236/02:1264	-			?																					23	
A*02:1022	-		2	3																					23	
A*02:1095	-			3																			22	23		
A*02:1158/02:1165/02:1172	-			3								?													23	
A*02:1171	-			3	w																		?	23		
A*02:1258	-			3	?																		22	23		

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	24
A*03:01:01:01-03:01:38/03:01:40-03:01:140/03:03N-03:09/03:11:01N-03:23:02/03:25-03:29/03:33-03:64/03:66-03:68N/03:70-03:72/03:74-03:75/03:77-03:81/03:83-03:88/03:89:02/03:91N-03:102/03:104-03:105/03:108-03:112/03:114-03:151/03:153-03:159/03:161N-03:163/03:165-03:166/03:168N-03:170/03:172-03:193/03:195-03:197:02N/03:199/03:201-03:217/03:220-03:222/03:224/03:226-03:235/03:238-03:240/03:243/03:245-03:252/03:254-03:259/03:261-03:270/03:272/03:276-03:280:02/03:283N-03:284N/03:286N-03:308/03:310-03:313/03:315-03:317/03:320-03:332/03:334N-03:342N/03:344:01-03:347/03:349-03:355/03:357N-03:372/03:374N-03:384/03:386-03:412/03:414-03:427/03:429-03:441/03:443-03:452/03:454-03:457/03:459-03:465/03:467-03:472/03:474-03:476/03:478-03:495/03:497-03:501Q/03:503-03:530	A3, Null, -				4																				
A*03:01:39	-				4											15					20				
A*03:02:01:01-03:02:07/03:02:09/03:31-03:32/03:65/03:69N/03:73/03:76/03:82/03:90/03:106/03:113/03:160/03:198/03:218/03:223/03:236-03:237/03:242/03:244/03:253/03:274-03:275N/03:281/03:285/03:309/03:314/03:318-03:319/03:333/03:348/03:356/03:385/03:453/03:458Q/03:466/03:473/03:477/03:502/03:531, A*11:130	A3, -, Null				4										w										
A*03:02:08	-				4										w	15					20				
A*03:10/03:167/03:225, A*11:199:01/11:222	-				4										14										
A*03:24	A3				4									13											
A*03:30/03:273	-				4		6																		
A*03:89:01	-				4																			23	
A*03:103:01-03:103:02/03:282	-				4								12												
A*03:152, A*24:673	-				4		6												18						
A*03:171/03:271/03:373/03:428/03:442, A*68:71	-				4																21				
A*03:219, A*32:04/32:52:01	-				4														18						
A*03:241/03:343, A*69:07	-				4																		22		
A*03:496	-		2		4										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	24
A*11:01:01:01-11:01:34/11:01:36-11:01:56/11:01:58-11:01:103/11:01:105-11:09/11:11-11:16/11:18-11:22/11:26/11:29-11:30/11:32:01-11:34/11:36-11:37/11:41-11:44/11:46-11:49/11:51-11:52Q/11:54:01-11:56/11:58-11:77/11:79-11:93/11:95-11:97/11:99N-11:110/11:113-11:115N/11:117-11:129/11:131-11:139/11:141-11:157/11:159-11:175/11:177/11:179-11:182Q/11:184-11:189/11:192-11:198/11:200-11:208:02N/11:210N/11:212-11:221/11:224-11:225/11:227-11:228/11:230-11:249/11:251N-11:257/11:259-11:268/11:270/11:272Q-11:289/11:291-11:309/11:311-11:324/11:327-11:345/11:347N-11:358/11:360-11:371/11:373-11:379/11:381-11:388N/11:390-11:391/11:393-11:395/11:398-11:431/11:433N-11:434/11:436N-11:449/11:451-11:503/11:505/11:507-11:512, A*24:89/24:290, A*68:129	A11, -, Null														14										
A*11:01:104/11:23/11:98/11:229/11:250/11:258/11:346, A*33:19	-														w										
A*11:10	A11													13	14										
A*11:27/11:38-11:39/11:209	-	1													14										
A*11:57/11:359, A*68:09/68:26/68:28/68:134/68:171:02N/68:204	-, A28, Null														14						21				
A*11:116/11:140	-												12		14										
A*11:178/11:190, A*24:02:17/24:02:49/24:02:89/24:08/24:21:01-24:21:02/24:21:04/24:29/24:31/24:42/24:67/24:77/24:156/24:158N/24:191/24:200/24:237/24:273/24:309-24:310:01/24:326/24:342/24:359N/24:370N/24:389N/24:489/24:506/24:562/24:601/24:619/24:624/24:636N/24:663, B*51:55, B*57:129	-, A24(9), Null							7																	
A*11:199:02-11:199:03	-				w										14										
A*11:325, A*24:19/24:28/24:44/24:379/24:406/24:424	-, A9, A24(9)					6									14										
A*11:372, A*31:89, A*34:19, A*66:23/66:30	-												12												
A*11:389/11:392/11:396-11:397N/11:432N/11:435/11:450	-, Null														?										
A*23:01:01:01-23:01:20/23:01:22-23:02/23:04-23:08N/23:10:01-23:17:02/23:18-23:22/23:23:02/23:25-23:27/23:29-23:30/23:32-23:33/23:35-23:36/23:38N-23:44/23:46-23:50/23:52-23:54/23:56/23:58-23:60/23:62-23:65/23:67-23:68/23:70-23:79/23:81-23:82/23:84N-23:99/23:101-23:103N/23:106N-23:112/23:114-23:127/23:129/23:131-23:136/23:138-23:140/23:142N-23:153/23:155-23:157N, A*24:315	A23(9), -, Null					5	6																		
A*23:01:21	-			3		5	6																		
A*23:03:01/23:83, A*32:170	-					5												18							
A*23:03:02:01-23:03:02:02/23:09/23:23:01/23:28/23:37:01-23:37:02/23:51/23:61/23:80/23:100/23:154, A*24:24/24:392, B*18:27	-					5																			
A*23:17:03	-					?	6																		

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	24
A*23:24/23:34/23:57/23:66/23:104/23:130/23:137, A*24:02:74/24:02:146/24:04/24:06/24:13:01-24:13:03/24:22/24:87/24:107/24:109/24:167/24:207:01-24:207:02/24:227/24:285/24:289/24:299/24:339/24:355/24:373/24:381/24:405/24:446/24:478/24:569/24:572/24:599, A*33:21/33:53	-, A24(9), A9						6																		
A*23:31/23:45/23:55	-	1				5	6																		
A*23:105, A*24:71/24:527	-					5	6	7																	
A*23:141	-					?	6	7																	
A*24:02:01:01-24:02:05/24:02:07-24:02:16/24:02:18-24:02:48/24:02:50-24:02:63/24:02:65/24:02:67-24:02:73/24:02:75/24:02:77-24:02:88/24:02:90-24:02:145/24:02:147-24:02:166/24:02:168-24:02:177/24:02:179-24:02:182/24:02:184/24:02:186-24:03:06/24:05:01-24:05:02/24:07:01:01-24:07:05/24:09N-24:11N/24:14:01:01-24:14:01:04/24:17:01:01-24:17:02/24:20:01:01-24:20:03/24:23/24:25-24:27/24:30/24:32-24:40N/24:43/24:45N-24:50/24:52-24:64/24:66/24:68-24:70/24:72-24:76/24:78-24:86N/24:88/24:90:01N-24:91/24:93/24:95-24:106/24:108/24:110-24:128/24:130-24:137/24:139-24:155N/24:157/24:159-24:166/24:168-24:187/24:189-24:190/24:192-24:199/24:201-24:203/24:205-24:206/24:208:02:01-24:210/24:212/24:214-24:226:02/24:229-24:234/24:236/24:238-24:272:02/24:274-24:284/24:286-24:288/24:291-24:292:02/24:294Q-24:298/24:300-24:308/24:311-24:314/24:316-24:325/24:327-24:338/24:341/24:343:02-24:354/24:356-24:358/24:360-24:369/24:371-24:372/24:374-24:376/24:378Q/24:380/24:382-24:388N/24:390-24:391/24:393-24:404/24:407-24:414/24:416-24:423/24:425N-24:427N/24:429N-24:445N/24:447Q-24:452:01/24:453-24:470/24:472-24:477/24:479Q-24:488/24:490-24:498/24:500-24:503/24:505/24:507-24:514N/24:516-24:521/24:523-24:526/24:528-24:550/24:552-24:555/24:558-24:559/24:561:01-24:561:02/24:563-24:568N/24:570-24:571/24:573-24:598/24:600/24:602-24:605/24:607-24:608N/24:611-24:615/24:617-24:618/24:620/24:622-24:623N/24:625N-24:635/24:637-24:643/24:646-24:651N/24:653-24:662/24:664-24:671/24:674N-24:677	A24(9), Low A24(9), -, A2403, A9, Null						6	7																	
A*24:02:06/24:340	A24(9), -						6	7																23	
A*24:02:64/24:02:66/24:343:01/24:415/24:428N	-, Null						w	7																	
A*24:02:76	-			3			6	7																	
A*24:02:167/24:02:178/24:02:183/24:452:02/24:556N/24:560/24:644	-, Null						6	?																	
A*24:02:185/24:609	-						6	7			10														
A*24:15/24:41/24:51/24:92/24:235/24:499/24:504/24:551/24:557	-	1					6	7																	
A*24:18/24:204/24:213, A*31:08/31:234, A*32:79	A24(9)/A3, -						6											18							

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	24
A*24:21:03, A*32:02/32:22	-, A32(19)							7											18						
A*24:94/24:138/24:188/24:228/24:515/24:610, A*68:249	-						6														21				
A*24:208:01	-						6	7											18						
A*24:293/24:621	-						6	7													21				
A*24:310:02	-			3				7																	
A*24:377	-						6	w																	
A*24:522/24:606/24:616/24:645	-						?	7																	
A*24:652	-						6	?							14										
A*24:672	-						6								?										
A*25:01:01:01-25:01:01:12/25:01:03-25:01:07/25:01:10-25:01:16/25:01:18-25:01:26/25:03/25:05-25:10/25:12N-25:13/25:15-25:23/25:25-25:32/25:34-25:35/25:37-25:38/25:40-25:42N/25:45-25:58/25:60-25:64/25:66-25:74/25:76:01-25:76:02/25:78-25:80/25:83-25:88/25:90-25:100	A25(10), -, Null								8	9															
A*25:01:02, B*07:02:74	A25(10), -							w	9																
A*25:01:08/25:39	-							8	w																
A*25:02	A25(10)							8	9				12												
A*25:04/25:44	-							7	8	9															
A*25:11	-							w	9	10															
A*25:14/25:89, A*30:12:01/30:18:01-30:18:02/30:41/30:166/30:209N, A*32:101Q, B*15:16:06, C*04:01:49, C*12:328, C*15:222	-, A30(19), Null							8																	
A*25:24/25:33, A*26:01:02/26:01:13/26:01:63/26:110/26:227/26:260N, A*66:03:01:01-66:03:01:03/66:05/66:15/66:28N/66:39N, B*18:02:02, B*38:02:04	-, A26(10), Null, A10								9																
A*25:36/25:65	-	1						8	9																
A*25:43, A*34:02:08	-												13												
A*25:75	-							w	9			12													
A*25:77	-						6	8																	
A*25:81	-									?															
A*25:82	-						6			?															

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	24
A*26:01:01:01-26:01:01:60/26:01:03-26:01:12/26:01:14-26:01:26/26:01:28-26:01:37/26:01:39-26:01:58/26:01:60-26:01:62/26:01:64-26:01:66-26:01:78/26:01:80-26:01:85/26:01:87/26:01:90-26:03:01:02/26:03:03-26:12:01:02/26:14-26:18/26:20:01-26:28/26:30/26:32/26:34-26:43:02/26:45-26:47/26:50-26:59:02/26:61-26:68/26:70-26:71N/26:73-26:75/26:77-26:83/26:86-26:109/26:111-26:124/26:126-26:130/26:132-26:142/26:145N-26:169/26:171-26:183/26:185-26:203/26:206:01N-26:224/26:228-26:233/26:235-26:237/26:239-26:259/26:261-26:263/26:265-26:266N	A26(10), -, Null, A10									9	10														
A*26:01:27/26:84/26:184	-										10														
A*26:01:38/26:31/26:76/26:170	-									w	10														
A*26:01:79/26:01:86/26:01:88/26:234/26:264	-									?	?														
A*26:01:89/26:225	-									9	?														
A*26:13/26:226	-									9	10		12												
A*26:19	-										10		12												
A*26:29/26:49/26:205	A26(10), -	1								9	10														
A*26:33, A*34:06, A*66:01:01:01-66:02:01:03/66:04/66:06-66:09/66:11-66:14/66:16-66:18/66:20-66:22/66:24-66:27N/66:29/66:31-66:38/66:40/66:42-66:54/66:56	-, A66(10), Null									9			12												
A*26:48/26:69	-									9	10	11													
A*26:72	-		2								10														
A*26:143	-									w	w														
A*26:238	-									?	10														
A*29:01:01:01-29:01:06/29:01:08-29:02:35/29:02:37-29:02:39/29:02:41-29:06/29:08N-29:12/29:15-29:18/29:20-29:31/29:33-29:38/29:40-29:47/29:50/29:52-29:59/29:61-29:68/29:70-29:72/29:74-29:104/29:106-29:110/29:112N-29:158/29:160-29:163/29:165-29:178/29:180-29:208, A*32:30:02, A*74:10/74:41	A29(19), Null, -															15									
A*29:02:40/29:179	-															?									
A*29:07/29:49	-					5										15									
A*29:13, A*32:30:01/32:32	-															15			18						
A*29:14	-															15		17							
A*29:19/29:39/29:159	-															15				20					
A*29:32	-												12			15									
A*29:48	-															15				19	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	24
A*29:51/29:69/29:73	-															15					21				
A*29:105/29:164	-															15			19						
A*29:111	-															w									
A*30:01:01:01-30:01:07/30:01:09-30:02:09/30:02:11-30:02:31/30:02:33-30:04:01:03/30:04:03-30:04:05/30:06/30:08:01-30:11:02/30:14L-30:15/30:17/30:19-30:20/30:23-30:25/30:27N-30:40/30:42-30:43/30:45/30:47-30:54/30:56-30:81/30:83/30:85-30:88/30:91-30:95/30:97-30:123N/30:125-30:151/30:153-30:162/30:165/30:167-30:183/30:185/30:187-30:188/30:190-30:205/30:207-30:208N/30:211-30:218/30:220Q-30:238/30:240N-30:251/30:253-30:257	A30(19), -, Null								8								16								
A*30:01:08	-								8								w								
A*30:02:10	-								8		10														
A*30:02:32/30:04:02/30:90/30:96/30:124/30:219N	-, Null																16								
A*30:07/30:13/30:16/30:22/30:44/30:46	-								8								16						w		
A*30:55	-				4				8																
A*30:89/30:186	-				4				8								16								
A*30:152, A*31:01:02:01-31:01:06/31:01:08-31:01:46/31:01:48-31:06/31:09/31:11:01-31:20/31:23/31:25-31:28/31:30-31:44:01/31:45-31:74/31:76-31:88/31:91-31:96/31:98-31:103/31:105-31:108/31:110-31:114/31:116-31:135/31:137-31:201N/31:203/31:205-31:209/31:211-31:221/31:223-31:233/31:235-31:240/31:242-31:247	-, A31(19), Null																	17							
A*30:163	-								8					13			16								
A*30:164	-								8						14		16								
A*30:189/30:206/30:210/30:252	-								?								?								
A*31:01:47/31:202N/31:204/31:241N	-, Null																	?							
A*31:07/31:10/31:222	-, A31(19)																	17	18						
A*31:24/31:97/31:136	-														w			17							
A*31:29	-					5												17							
A*31:104	-																	w							
A*31:115	-												12					17							
A*32:13	-	1																	18						
A*32:15/32:93	-																		18	19					
A*32:17	-				w								12						18						
A*32:24	-		2																18						

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	24
A*32:28:02	-																		?						
A*32:75/32:94	-																		w						
A*32:109	-																		18			21			
A*33:01:01:01-33:01:04/33:01:06-33:01:22/33:03:01:01-33:03:25/33:03:28-33:03:30/33:03:32-33:03:55/33:03:57/33:03:59-33:18:01/33:20/33:22-33:29/33:31/33:33:01-33:34/33:36-33:37/33:39-33:48/33:50-33:52/33:54-33:58/33:60-33:65/33:67-33:80N/33:82-33:88/33:90-33:101/33:103-33:121/33:123N-33:124/33:126-33:129N/33:132-33:134/33:136-33:139/33:141-33:143N/33:145-33:149/33:151/33:153-33:157N/33:160-33:174N/33:176N/33:178-33:182/33:184-33:186/33:189/33:191-33:214/33:216-33:248N/33:250-33:251/33:253-33:281/33:283-33:287/33:289-33:296, B*07:02:40, B*08:01:07, B*15:02:07, B*55:02:10	A33(19), -, A19, Null, B8																		19						
A*33:03:26/33:03:31/33:66/33:140N/33:158/33:188	-, Null																			w					
A*33:03:56/33:215	-																		?						
A*33:49/33:144	-													13						19					
A*33:59/33:102/33:150/33:177/33:190	-														w					19					
A*33:125/33:131/33:288	-												12							19					
A*33:183	-											11								19					
A*33:187	-					5														19					
A*33:249	-																	?		?					
A*33:252, A*68:319	-																			19		21			
A*34:01:01:01-34:01:08/34:05/34:11/34:14/34:16-34:18/34:27/34:31/34:34	A34(10), -									9		11	12												
A*34:02:01:01-34:02:07/34:03-34:04/34:07/34:09-34:10N/34:13/34:15/34:20-34:22/34:25-34:26N/34:29N-34:30N/34:32-34:33/34:35	A34(10), -, Null									9				13											
A*34:08	-				4					9				13											
A*34:12	-											11	12												
A*34:23	-									w		11	12												
A*34:24	-									w															
A*34:28	-									9				?											
A*43:01-43:03	A43, Null, -										10														24
A*66:10	-	1								9			12												
A*66:19	-									9			12		14										
A*66:41	-									w			12												

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	24
A*66:55	-									?			12												
A*68:01:28/68:01:36/68:130:02	-															15					20	21			
A*68:01:67/68:258/68:311, B*40:577	-																					?			
A*68:103:01-68:103:02	-													13								21			
A*68:262	-												12									21			
A*68:294	-									9			12									21			
A*68:308, A*69:01:01:01-69:01:04/69:01:06-69:02/69:04-69:06/69:08-69:09	-, A69(28)																					21	22		
A*69:01:05	-													13								21	22		
A*69:03	-														14							21	22		
A*74:01:01:01-74:01:09/74:01:11-74:03:03/74:05-74:09/74:11-74:12N/ 74:14N-74:15/74:16:02-74:20/74:22-74:40/74:44-74:45/74:47N/74:49-74:53	A74(19), -, Null																				20				
A*74:01:10	-																					?			
A*74:04/74:21/74:43	-																			19	20				
A*74:13	-				4								12								20				
A*74:42	-				?								12			15									
A*74:46	-		2													15									
A*80:01:01:01-80:01:02/80:03/80:05-80:10	A80, -, Null																								24
B*07:225/07:260	-								w																
B*15:01:83	-			?																					
B*35:01:60, B*51:01:34, C*06:247, C*07:02:27/07:577	-																							w	
B*35:08:14/35:14:03	-													w											
B*40:589, B*51:421	-					?																			
B*57:148, C*03:703, C*04:229:02	-								?																
C*07:1034	-																						?		

w = weak

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

14. Certificate of Analysis



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CTS Collaborative Transplant Study

Certificate of Analysis

HLA-A* CTS-PCR-SSP Tray Kit

Product number	101
Lot number	A18-0
Number of HLA-specific primer mixes per test	24

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	24.06.2026
Approved by	H. Tran, M.D. Quality Control, Supervisor