

Olerup SSP[®] HLA-B*51

Product number:	101.561-24u/03u – without <i>Taq</i> pol.
Lot number:	15K
Expiry date:	2012-June-01
Number of tests:	24 tests – Product No. 101.561-24u 3 tests – Product No. 101.561-03u
Number of wells per test:	64
Storage - pre-aliquoted primers:	dark at -20°C
- PCR Master Mix:	-20°C
- Adhesive PCR seals	RT
- Product Insert	RT

This Product Description is only valid for Lot No. 15K.

CHANGES COMPARED TO THE PREVIOUS *OLERUP SSP*[®] HLA-B*51 LOT.

The HLA-B*51 specificity and interpretation tables have been updated for the HLA-B alleles described since the previous *Olerup SSP*[®] HLA-B*51 lot was made (Lot No. 76F).

Sixteen wells have been added to the HLA-B*51 kit,
wells **49 to 64**.

The amplification patterns for some rare HLA-B*51
alleles only differ by the length of the specific PCR
products.

The primers of the wells detailed below have been exchanged, added or modified compared to the previous lot.

Well	5'-primer	3'-primer	rationale
26	-	-	Exchanged positive control primer pair.
27	Modified	-	Exchanged positive control primer pair, modified 5'-primer for improved specificity.
31	-	-	Exchanged positive control primer pair.
39	Added	-	Primers added for the B*51:64 and B*51:65 alleles.
44	Added	-	Primer pair added for the B*51:76 allele.

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49	New	New	New primer pair for the B*51:07:02 allele.
50	New	New	New primer pair for the B*51:81 allele.
51	New	New	New primer pairs for the B*51:68 and B*51:72 alleles.
52	New	New	New primer pair for the B*51:69 allele.
53	New	New	New primer pairs for the B*51:70 and B*51:71 alleles.
54	New	New	New primer pair for the B*51:74 allele.
55	New	New	New primer pairs for the B*51:75 and B*51:77 alleles.
56	New	New	Improved allelic resolution.
57	New	New	New primer pairs for the B*51:78 and B*51:79 alleles.
58	New	New	New primer pair for the B*51:80 allele.
59	New	New	New primer pairs for the B*51:83 and B*51:88 alleles.
60	New	New	New primer pairs for the B*51:84 and B*51:94 alleles.
61	New	New	New primer pairs for the B*51:85 and B*51:87 alleles.
62	New	New	New primer pairs for the B*51:86 and B*51:95 alleles.
63	New	New	New primer pairs for the B*51:89 and B*51:91 alleles.
64	New	New	New primer pairs for the B*51:66 and B*51:67 alleles.

PRODUCT DESCRIPTION

HLA-B*51 SSP subtyping

CONTENT

The primer set contains 5'- and 3'-primers for identifying the B*51:01 to B*51:95 alleles.

PLATE LAYOUT

Each test consists of 64 PCR reactions in a 96 well PCR plate. Wells 65 to 96 are empty

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	42	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64
empty	empty	empty	empty	empty	empty	empty	empty
empty	empty	empty	empty	empty	empty	empty	empty
empty	empty	empty	empty	empty	empty	empty	empty
empty	empty	empty	empty	empty	empty	empty	empty

The 96 well cut PCR plate is marked with 'HLA-B*51' in silver/gray ink.

Well No. 1 is marked with the Lot No. '15K'.

A faint row of numbers is seen between wells 1 and 2 or wells 7 and 8 of the PCR trays. These stem from the manufacture of the trays, and should be disregarded.

The PCR plates are covered with a PCR-compatible foil.

INTERPRETATION

The interpretation of HLA-B*51 SSP subtypings will be influenced by most B*07, twelve B*08, most B*13, the B*14, many B*15, the B*18, eleven B*27, most B*35, the B*37, two B*38, eleven B*39, many B*40, six B*41, two B*42, most B*44, the B*45, two B*46, most B*48, the B*49, the B*50, the B*52, the B*53, the B*54, the B*55, the B*56, most B*57, most B*58, the B*59, the B*73:01, the B*78, the B*81, the B*82 and the B*83:01 alleles when present on the other haplotype.

In addition, primer mixes 2 and 7 will amplify the C*01:30 allele, primer mix 50 will amplify the C*03:05, C*03:25, C*03:27 and C*08:08 alleles, primer mix 41 will amplify the C*08:24 allele and primer mixes 34 and 35 will amplify the C*15:15 allele.

UNIQUELY IDENTIFIED ALLELES

All the HLA-B*51 alleles, i.e. **B*51:01 to B*51:95**, recognized by the HLA Nomenclature Committee in April 2010¹ will give rise to unique amplification patterns by the primers in the HLA-B*51 subtyping kit.

The HLA-B*51 subtyping kit cannot distinguish the B*51:01:01, 51:01:03-51:01:07, 51:01:10-51:01:14 and 51:01:16-51:01:17 alleles, the B*51:01:08 and 51:01:15 alleles, the B*51:02:01 and 51:02:03-51:02:04 alleles, the B*51:13:01-51:13:02 alleles or the B*51:24:02-51:24:03 alleles.

The B*51:51 and 51:76 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 44.

The B*51:66 and 51:67 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 64.

The B*51:68 and 51:72 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 51.

The B*51:70 and 51:71 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 53.

The B*51:75 and 51:77 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 55.

The B*51:83 and 51:88 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 59.

The B*51:84 and 51:94 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 60.

The B*51:86 and 51:95 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 62.

¹HLA-B alleles listed on the IMGT/HLA web page 2010-April-01, release 3.0.0, www.ebi.ac.uk/imgt/hla.

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RESOLUTION IN HOMO- AND HETEROZYGOTES

The 93 HLA-B*51 alleles will give rise to 92 different amplification patterns, as some alleles have patterns that only differ in size of specific PCR product.. These can be combined in 4 278 homozygous and heterozygous combinations. 1556 of these genotypes do not give rise to unique amplification patterns. (The different sizes of the specific PCR products generated by primer mixes 9, 10, 15, 18, 21, 25 to 28, 31, 37, 41 to 44, 48, 51, 53, 55, 57 and 59 to 64 were not considered in these calculations.)

+++++--	-----	-----+	----++	-----+	+-----	+-----	-----	51:03,51:05 = 51:03,51:54
+++++--	-----	-----+	----++	-----+	+-----	+-----	-----	51:05,51:56 = 51:54,51:56
+++++--	-----	-----+	----++	-----+	+-----	+-----	-----	51:05,51:46 = 51:46,51:54
+++++--	-----	-----+	----++	-----+	+-----	+-----	-----	51:04,51:05 = 51:04,51:54
+++++--	-----	-----+	----++	-----+	+-----	+-----	-----	51:05,51:64 = 51:54,51:64
+++++--	-----	-----+	----++	-----+	+-----	+-----	-----	51:05,51:06 = 51:06,51:54
+++++--	-----	-----+	----++	-----+	+-----	+-----	-----	51:05,51:07:01 = 51:07:01,51:54
+++++--	-----	-----+	----++	-----+	+-----	+-----	-----	51:05,51:07:02 = 51:07:02,51:54
+++++--	+-----+	-----+	----++	-----+	+-----	+-----	-----	51:05,51:35 = 51:35,51:54
+++++--	+-----+	-----+	----++	-----+	+-----	+-----	-----	51:15,51:17 = 51:15,51:35
+++++--	+-----+	-----+	----++	-----+	+-----	+-----	-----	51:05,51:17 = 51:17,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:10,51:49 = 51:10,51:60
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:10,51:50 = 51:10,51:58
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:01:02,51:10 = 51:01:09,51:10
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:10,51:78 = 51:10,51:79
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:10,51:85 = 51:10,51:87
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:10,51:89 = 51:10,51:91
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:01,51:10 = 51:01:08,51:10 =
								51:10,51:24:01 = 51:10,51:24
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:24 = 51:24,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:21 = 51:21,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:01:09,51:05 = 51:01:09,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:15,51:16 = 51:18,51:93
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:16 = 51:05,51:82 =
								51:16,51:54 = 51:29,51:93 =
								51:54,51:82
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:49,51:93 = 51:60,51:93
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:50,51:93 = 51:58,51:93
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:85,51:93 = 51:87,51:93
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:01,51:93 = 51:01:08,51:93
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:11N = 51:11N,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:12 = 51:12,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:18 = 51:15,51:29 =
								51:18,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:15,51:49 = 51:15,51:60
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:01,51:15 = 51:15,51:18
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:22 = 51:22,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:28 = 51:28,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:24:01 = 51:24:01,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:26 = 51:26,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:38 = 51:38,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:27N = 51:27N,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:30 = 51:30,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:32 = 51:32,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:33 = 51:33,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:39 = 51:39,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:41N = 51:41N,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:43 = 51:43,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:55 = 51:54,51:55
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:65 = 51:54,51:65
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:49 = 51:05,51:60 =
								51:49,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:50 = 51:05,51:58 =
								51:54,51:58
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:51 = 51:51,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:52 = 51:52,51:54
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:57 = 51:54,51:57
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:61 = 51:05,51:90 =
								51:54,51:61
+++++--	-+-----	-+-----	----++	-----+	+-----	+-----	-----	51:05,51:68 = 51:54,51:68

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+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:69 = 51:54,51:69
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:70 = 51:54,51:70
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:74 = 51:54,51:74
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:75 = 51:54,51:75
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:79 = 51:54,51:79
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:80 = 51:54,51:80
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:83 = 51:54,51:83
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:84 = 51:54,51:84
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:85 = 51:05,51:87 = 51:54,51:87
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:86 = 51:54,51:86
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:91 = 51:54,51:91
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:66 = 51:54,51:66
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01,51:05 = 51:01,51:54 = 51:01:08,51:05 = 51:05,51:29 = 51:05,51:48 = 51:29,51:54 = 51:48,51:54
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:40,51:49 = 51:40,51:60
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:40,51:50 = 51:40,51:58
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:40,51:78 = 51:40,51:79
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:40,51:85 = 51:40,51:87
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:40,51:89 = 51:40,51:91
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01,51:40 = 51:01:08,51:40
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:05,51:89 = 51:54,51:89
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01:02,51:05 = 51:01:02,51:54
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:02,51:07:02 = 51:02:02,51:07:01
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:24:01,51:36 = 51:24,51:36
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:36,51:49 = 51:36,51:60
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:36,51:50 = 51:36,51:58
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01:02,51:36 = 51:01:09,51:36
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:36,51:78 = 51:36,51:79
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:36,51:85 = 51:36,51:87
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:36,51:89 = 51:36,51:91
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01,51:36 = 51:01:08,51:36 = 51:28,51:36
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01:09,51:02 = 51:02:02,51:21
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:02,51:82 = 51:29,51:34
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:34,51:49 = 51:34,51:60
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:34,51:50 = 51:34,51:58
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01:02,51:34 = 51:02:02,51:16
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:34,51:78 = 51:34,51:79
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:34,51:85 = 51:34,51:87
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:34,51:89 = 51:34,51:91
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01,51:34 = 51:01:08,51:34 = 51:02,51:16
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:02,51:33 = 51:23,51:33 = 51:23,51:39
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:23,51:49 = 51:23,51:60
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:23,51:50 = 51:23,51:58
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:23,51:78 = 51:23,51:79
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:23,51:85 = 51:23,51:87
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:23,51:89 = 51:23,51:91
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01,51:23 = 51:01:08,51:23
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:02:02,51:49 = 51:02:02,51:60
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:02,51:49 = 51:02,51:60
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:02:02,51:50 = 51:02:02,51:58
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:02,51:50 = 51:02,51:58
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:02:02,51:85 = 51:02:02,51:87
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01,51:02:02 = 51:01:02,51:02 = 51:01:08,51:02:02
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:02,51:78 = 51:02,51:79
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:02,51:85 = 51:02,51:87
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:02,51:89 = 51:02,51:91
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01,51:02 = 51:01:08,51:02
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:03,51:09:01 = 51:03,51:73
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:03,51:30 = 51:03,51:53
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:03,51:49 = 51:03,51:60
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:03,51:50 = 51:03,51:58
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:03,51:78 = 51:03,51:79
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:03,51:85 = 51:03,51:87
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:03,51:89 = 51:03,51:91
+++--+--	-----	-----++	----+--	-----+	+-----	+--+--+	-----	51:01,51:03 = 51:01:08,51:03 = 51:03,51:03

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+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:09:01,51:46 = 51:46,51:73
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:04,51:09:01 = 51:04,51:73
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:04,51:64 = 51:06,51:46 =
								51:46,51:64 = 51:56,51:64
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:04,51:06 = 51:06,51:56
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:30,51:56 = 51:53,51:56
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:30,51:46 = 51:46,51:53
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:04,51:30 = 51:04,51:53
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:49,51:56 = 51:56,51:60
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:50,51:56 = 51:56,51:58
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:56,51:78 = 51:56,51:79
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:56,51:85 = 51:56,51:87
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:56,51:89 = 51:56,51:91
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:01,51:56 = 51:01:08,51:56 =
								51:39,51:56
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:46,51:49 = 51:46,51:60
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:46,51:50 = 51:46,51:58
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:46,51:78 = 51:46,51:79
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:46,51:85 = 51:46,51:87
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+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:01,51:46 = 51:01:08,51:46 =
								51:04,51:65 = 51:39,51:46 =
								51:46,51:65
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+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:01,51:04 = 51:01:08,51:04 =
								51:04,51:39
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								51:56,51:56 = 51:56,51:59
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+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:09:01,51:62 = 51:62,51:73
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:09:01,51:64 = 51:64,51:73
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:06,51:09:01 = 51:06,51:73
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:09:01,51:45 = 51:45,51:73
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:07:01,51:09:02 =
								51:07:02,51:09:01 =
								51:07:02,51:73
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								51:07:01,51:73
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+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:01:09,51:09:01 =
								51:01:09,51:73 = 51:09:02,51:21
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:09:01,51:21 = 51:21,51:73
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								51:73,51:82
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+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:31,51:78 = 51:31,51:79
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+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:31,51:89 = 51:31,51:91
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								51:09:01,51:16 = 51:16,51:73
+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:09:01,51:11N = 51:11N,51:73
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+++++--	-----	-----++	---+---	-----+	-----	-----+	-----	51:09:01,51:92 = 51:73,51:92
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								51:09:01,51:14 = 51:14,51:19 =
								51:14,51:73

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+++++--	-----	+-----+	----+--	-----+	-----	-----+	-----	51:09:01,51:28 = 51:28,51:73
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+++++--	-----	-----++	+-----	-----+	-----	-----+	-----	51:09:01,51:41N = 51:41N,51:73
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+++++--	-----	-----++	----+--	-----+	---+---	-----	-----	51:09:01,51:57 = 51:57,51:73
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+++++--	-----	-----++	----+--	-----+	-----	--+-----	-----	51:09:01,51:68 = 51:68,51:73
+++++--	-----	-----++	----+--	-----+	-----	--+-----	-----	51:09:01,51:69 = 51:69,51:73
+++++--	-----	-----++	----+--	-----+	-----	--+-----	-----	51:09:01,51:70 = 51:70,51:73
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+++++--	-----	-----++	----+--	-----+	-----	-----	-----	51:09:01,51:89 = 51:09:01,51:91 = 51:73,51:89 = 51:73,51:91
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+++++--	+-----+	-----++	----+--	-----+	+-----	-----	-----	51:49,51:62 = 51:60,51:62
+++++--	+-----+	-----++	----+--	-----+	-----	-----	-----	51:62,51:89 = 51:62,51:91
+++++--	+-----+	-----++	----+--	-----+	-----	-----	-----	51:01,51:62 = 51:18,51:62
+++++--	+-----+	-----++	----+--	-----+	-----	-----	-----	51:06,51:62 = 51:59,51:62
+++++--	+-----+	-----++	+-----	-----+	-----	-----	-----	51:30,51:64 = 51:53,51:64
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+++++--	+-----+	-----++	----+--	-----+	+-----	-----	-----	51:50,51:64 = 51:58,51:64
+++++--	+-----+	-----++	----+--	-----+	-----	-----	+-----	51:64,51:78 = 51:64,51:79
+++++--	+-----+	-----++	----+--	-----+	-----	-----	-----	51:64,51:85 = 51:64,51:87
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								51:01:09,51:24:01 =
								51:01:09,51:24
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	+-----	51:24,51:78 = 51:24,51:79
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:24,51:85 = 51:24,51:87
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:24,51:89 = 51:24,51:91
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01,51:24 = 51:01:08,51:24 =
								51:21,51:24:01 = 51:21,51:24 =
								51:24:01,51:24 = 51:24,51:24
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01:09,51:30 = 51:01:09,51:53
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:21,51:30 = 51:21,51:53
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01:09,51:49 = 51:01:09,51:60
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:21,51:49 = 51:21,51:60
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01:09,51:50 = 51:01:09,51:58
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:21,51:50 = 51:21,51:58
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01:09,51:85 = 51:01:09,51:87
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01,51:01:09 = 51:01:02,51:21
								= 51:01:08,51:01:09 =
								51:01:09,51:21
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:21,51:78 = 51:21,51:79
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:21,51:85 = 51:21,51:87
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:21,51:89 = 51:21,51:91
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01,51:21 = 51:01:08,51:21
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01:02,51:01:09 =
								51:01:09,51:01:09
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:30,51:82 = 51:53,51:82
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:16,51:30 = 51:16,51:53
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:49,51:82 = 51:60,51:82
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:50,51:82 = 51:58,51:82
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:16,51:61 = 51:61,51:82 =
								51:82,51:90
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:78,51:82 = 51:79,51:82
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:82,51:85 = 51:82,51:87
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:82,51:89 = 51:82,51:91
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01,51:82 = 51:01:08,51:82 =
								51:16,51:29 = 51:29,51:82 =
								51:48,51:82
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:16,51:49 = 51:16,51:60
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:16,51:50 = 51:16,51:58
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:16,51:78 = 51:16,51:79
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:16,51:85 = 51:16,51:87
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:16,51:89 = 51:16,51:91
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01,51:16 = 51:01:08,51:16
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:16,51:82 = 51:82,51:82
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:11N,51:30 = 51:11N,51:53
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:11N,51:49 = 51:11N,51:60
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:11N,51:50 = 51:11N,51:58
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:11N,51:78 = 51:11N,51:79
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:11N,51:85 = 51:11N,51:87
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:11N,51:89 = 51:11N,51:91
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01,51:11N = 51:01:08,51:11N
								= 51:11N,51:11N
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:12,51:30 = 51:12,51:53
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:12,51:49 = 51:12,51:60
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:12,51:50 = 51:12,51:58
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:12,51:78 = 51:12,51:79
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:12,51:85 = 51:12,51:87
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:12,51:89 = 51:12,51:91
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01,51:12 = 51:01:08,51:12 =
								51:12,51:12
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:30,51:92 = 51:53,51:92
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:13,51:30 = 51:13,51:53
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:13,51:37 = 51:37,51:92 =
								51:63,51:92
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:13,51:61 = 51:29,51:92 =
								51:48,51:92 = 51:61,51:92
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:13,51:29 = 51:13,51:48
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:49,51:92 = 51:60,51:92
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:13,51:49 = 51:13,51:60
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:89,51:92 = 51:91,51:92
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01,51:92 = 51:32,51:92
++-----	-+-----	--+-----	---+-----	-----+	-----	+-----	-----	51:01:08,51:92 = 51:13,51:90 =
								51:13,51:92 = 51:90,51:92 =
								51:92,51:92

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++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----+	51:13,51:89 = 51:13,51:91
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:01,51:13 = 51:13,51:32
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:01:08,51:13 = 51:13,51:13
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:14,51:30 = 51:14,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:14,51:49 = 51:14,51:60
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:14,51:89 = 51:14,51:91
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:01:08,51:14 = 51:14,51:14
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:18,51:30 = 51:18,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:18,51:49 = 51:18,51:60
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:18,51:50 = 51:18,51:58
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:18,51:78 = 51:18,51:79
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:18,51:85 = 51:18,51:87
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:18,51:89 = 51:18,51:91
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:01,51:18 = 51:01:08,51:18 = 51:18,51:18
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:22,51:30 = 51:22,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:22,51:49 = 51:22,51:60
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:22,51:50 = 51:22,51:58
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:22,51:78 = 51:22,51:79
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:22,51:85 = 51:22,51:87
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:22,51:89 = 51:22,51:91
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:01,51:22 = 51:01:08,51:22
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:28,51:30 = 51:28,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:28,51:49 = 51:28,51:60
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:28,51:50 = 51:28,51:58
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:28,51:78 = 51:28,51:79
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:28,51:85 = 51:28,51:87
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:28,51:89 = 51:28,51:91
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:01,51:28 = 51:01:08,51:28 = 51:28,51:28
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:24:01,51:30 = 51:24:01,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:24:01,51:49 = 51:24:01,51:60
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:24:01,51:50 = 51:24:01,51:58
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:24:01,51:78 = 51:24:01,51:79
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:24:01,51:85 = 51:24:01,51:87
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:24:01,51:89 = 51:24:01,51:91
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:01,51:24:01 = 51:01:08,51:24:01 = 51:24:01,51:24:01
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:26,51:30 = 51:26,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:26,51:49 = 51:26,51:60
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:26,51:50 = 51:26,51:58
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:26,51:78 = 51:26,51:79
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:26,51:85 = 51:26,51:87
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:26,51:89 = 51:26,51:91
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:01,51:26 = 51:01:08,51:26 = 51:26,51:26
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:38,51:49 = 51:38,51:60
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:38,51:50 = 51:38,51:58
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:38,51:78 = 51:38,51:79
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:38,51:85 = 51:38,51:87
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:38,51:89 = 51:38,51:91
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:01,51:38 = 51:01:08,51:38 = 51:27N,51:30 = 51:27N,51:38 = 51:27N,51:53 = 51:30,51:38 = 51:38,51:38 = 51:38,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:27N,51:49 = 51:27N,51:60
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:27N,51:50 = 51:27N,51:58
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:27N,51:78 = 51:27N,51:79
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:27N,51:85 = 51:27N,51:87
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:27N,51:89 = 51:27N,51:91
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:01,51:27N = 51:01:08,51:27N = 51:27N,51:27N
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:30,51:37 = 51:37,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:30,51:63 = 51:53,51:63
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:30,51:32 = 51:32,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:30,51:33 = 51:33,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:30,51:39 = 51:39,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:30,51:61 = 51:53,51:61
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:29,51:30 = 51:29,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:30,51:41N = 51:41N,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:30,51:43 = 51:43,51:53
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:30,51:55 = 51:53,51:55
++-----	-----+	-----++	-++-++-	-----+	-----	-----+	-----	51:30,51:65 = 51:53,51:65

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++-----	-----	-----++	+---+---	-----+	+-----	-----+	-----	51:30,51:48 = 51:48,51:53
++-----	-----	-----++	+---+---	-----+	+-----	-----+	-----	51:30,51:49 = 51:30,51:60 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:49,51:53 = 51:53,51:60
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:50 = 51:30,51:58 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:50,51:53 = 51:53,51:58
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:51 = 51:51,51:53
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:52 = 51:52,51:53
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:57 = 51:53,51:57
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:90 = 51:53,51:90
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:01:02,51:30 = 51:01:02,51:53
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:68 = 51:53,51:68
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:69 = 51:53,51:69
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:70 = 51:53,51:70
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:74 = 51:53,51:74
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:75 = 51:53,51:75
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:78 = 51:30,51:79 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:53,51:78 = 51:53,51:79
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:80 = 51:53,51:80
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:83 = 51:53,51:83
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:84 = 51:53,51:84
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:85 = 51:30,51:87 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:53,51:85 = 51:53,51:87
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:86 = 51:53,51:86
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:89 = 51:30,51:91 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:53,51:89 = 51:53,51:91
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:30,51:66 = 51:53,51:66
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:01,51:30 = 51:01,51:53 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:01:08,51:30 = 51:01:08,51:53
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	= 51:30,51:30 = 51:30,51:53
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:29,51:37 = 51:37,51:48 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:37,51:61 = 51:61,51:63
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:29,51:63 = 51:48,51:63
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:37,51:49 = 51:37,51:60
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:49,51:63 = 51:60,51:63
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:37,51:89 = 51:37,51:91
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:01,51:37 = 51:32,51:37 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:01:08,51:37 = 51:37,51:37 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:37,51:63 = 51:37,51:90 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:63,51:90
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:63,51:89 = 51:63,51:91
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:01,51:63 = 51:32,51:63
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:01:08,51:63 = 51:63,51:63
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:32,51:49 = 51:32,51:60
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:32,51:50 = 51:32,51:58
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:32,51:78 = 51:32,51:79
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:32,51:85 = 51:32,51:87
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:32,51:89 = 51:32,51:91
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:01,51:32 = 51:01:08,51:32 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:32,51:32
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:33,51:49 = 51:33,51:60
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:33,51:50 = 51:33,51:58
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:33,51:78 = 51:33,51:79
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:33,51:85 = 51:33,51:87
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:33,51:89 = 51:33,51:91
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:01,51:33 = 51:01:08,51:33 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:33,51:33 = 51:33,51:39
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:39,51:49 = 51:39,51:60
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:39,51:50 = 51:39,51:58
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:39,51:78 = 51:39,51:79
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:39,51:85 = 51:39,51:87
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:39,51:89 = 51:39,51:91
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:01,51:39 = 51:01:08,51:39 =
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:39,51:39
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:49,51:59 = 51:59,51:60
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:50,51:59 = 51:58,51:59
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:59,51:78 = 51:59,51:79
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:59,51:85 = 51:59,51:87
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:59,51:89 = 51:59,51:91
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:01,51:59 = 51:01:08,51:59
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:49,51:61 = 51:60,51:61
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:29,51:49 = 51:29,51:60
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:50,51:61 = 51:58,51:61
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:29,51:50 = 51:29,51:58
++-----	-----	-----++	+---+---	-----+	-----	-----+	-----	51:61,51:78 = 51:61,51:79

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++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:61,51:85 = 51:61,51:87
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:61,51:89 = 51:61,51:91
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:01,51:61 = 51:01:08,51:61 =
								51:29,51:61 = 51:29,51:90 =
								51:48,51:61 = 51:61,51:61 =
								51:61,51:90
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:29,51:78 = 51:29,51:79
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:29,51:85 = 51:29,51:87
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:29,51:89 = 51:29,51:91
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:01,51:29 = 51:01:08,51:29 =
								51:29,51:29 = 51:29,51:48
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:41N,51:49 = 51:41N,51:60
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:41N,51:50 = 51:41N,51:58
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:41N,51:78 = 51:41N,51:79
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:41N,51:85 = 51:41N,51:87
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:41N,51:89 = 51:41N,51:91
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:01,51:41N = 51:01:08,51:41N
								= 51:41N,51:41N
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:42,51:49 = 51:42,51:60
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:42,51:89 = 51:42,51:91
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:43,51:49 = 51:43,51:60
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:43,51:50 = 51:43,51:58
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:43,51:78 = 51:43,51:79
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:43,51:85 = 51:43,51:87
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:43,51:89 = 51:43,51:91
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:01,51:43 = 51:01:08,51:43 =
								51:43,51:43
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:55 = 51:55,51:60
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:50,51:55 = 51:55,51:58
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:55,51:78 = 51:55,51:79
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:55,51:85 = 51:55,51:87
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:55,51:89 = 51:55,51:91
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:01,51:55 = 51:01:08,51:55 =
								51:55,51:55
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:65 = 51:60,51:65
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:50,51:65 = 51:58,51:65
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:65,51:78 = 51:65,51:79
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:65,51:85 = 51:65,51:87
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:65,51:89 = 51:65,51:91
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:01,51:65 = 51:01:08,51:65 =
								51:65,51:65
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:48,51:49 = 51:48,51:60
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:48,51:50 = 51:48,51:58
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:48,51:78 = 51:48,51:79
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:48,51:85 = 51:48,51:87
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:48,51:89 = 51:48,51:91
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:01,51:48 = 51:01:08,51:48 =
								51:48,51:48
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:50 = 51:49,51:58 =
								51:50,51:60 = 51:58,51:60
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:51 = 51:51,51:60
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:52 = 51:52,51:60
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:57 = 51:57,51:60
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:90 = 51:60,51:90
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:01:02,51:49 = 51:01:02,51:60
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:81 = 51:60,51:81
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:68 = 51:60,51:68
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:69 = 51:60,51:69
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:70 = 51:60,51:70
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:74 = 51:60,51:74
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:75 = 51:60,51:75
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:78 = 51:49,51:79 =
								51:60,51:79
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:80 = 51:60,51:80
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:83 = 51:60,51:83
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:84 = 51:60,51:84
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:85 = 51:49,51:87 =
								51:60,51:85 = 51:60,51:87
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:86 = 51:60,51:86
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:89 = 51:49,51:91 =
								51:60,51:89 = 51:60,51:91
++-----	-----	-----++	-----++	-----+	-----+	-----+	-----+	51:49,51:66 = 51:60,51:66

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++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01,51:49 = 51:01,51:60 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01:08,51:49 = 51:01:08,51:60
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	= 51:49,51:49 = 51:49,51:60
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:51 = 51:51,51:58
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:52 = 51:52,51:58
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:57 = 51:57,51:58
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01:02,51:50 = 51:01:02,51:58
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:81 = 51:58,51:81
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:68 = 51:58,51:68
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:69 = 51:58,51:69
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:70 = 51:58,51:70
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:74 = 51:58,51:74
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:75 = 51:58,51:75
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:79 = 51:58,51:78 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:58,51:79
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:80 = 51:58,51:80
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:83 = 51:58,51:83
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:84 = 51:58,51:84
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:87 = 51:58,51:85 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:58,51:87
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:86 = 51:58,51:86
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:89 = 51:50,51:91 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:58,51:89 = 51:58,51:91
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:50,51:66 = 51:58,51:66
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01,51:50 = 51:01,51:58 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01:08,51:58 = 51:50,51:58 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:58,51:58
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01:08,51:50 = 51:50,51:50
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:51,51:78 = 51:51,51:79
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:51,51:85 = 51:51,51:87
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:51,51:89 = 51:51,51:91
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01,51:51 = 51:01:08,51:51 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:51,51:51
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:52,51:78 = 51:52,51:79
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:52,51:85 = 51:52,51:87
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:52,51:89 = 51:52,51:91
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01,51:52 = 51:01:08,51:52 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:52,51:52
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:57,51:78 = 51:57,51:79
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:57,51:85 = 51:57,51:87
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:57,51:89 = 51:57,51:91
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01,51:57 = 51:01:08,51:57 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:57,51:57
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:89,51:90 = 51:90,51:91
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01:08,51:90 = 51:90,51:90
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01:02,51:85 = 51:01:02,51:87
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01,51:01:02 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01:02,51:01:08
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:78,51:81 = 51:79,51:81
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:81,51:85 = 51:81,51:87
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:81,51:89 = 51:81,51:91
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01,51:81 = 51:01:08,51:81
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:68,51:78 = 51:68,51:79
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:68,51:85 = 51:68,51:87
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:68,51:89 = 51:68,51:91
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01,51:68 = 51:01:08,51:68 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:68,51:68
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:69,51:78 = 51:69,51:79
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:69,51:85 = 51:69,51:87
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:69,51:89 = 51:69,51:91
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01,51:69 = 51:01:08,51:69 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:69,51:69
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:70,51:78 = 51:70,51:79
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:70,51:85 = 51:70,51:87
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:70,51:89 = 51:70,51:91
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01,51:70 = 51:01:08,51:70 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:70,51:70
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:74,51:78 = 51:74,51:79
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:74,51:85 = 51:74,51:87
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:74,51:89 = 51:74,51:91
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:01,51:74 = 51:01:08,51:74 =
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:74,51:74
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:75,51:78 = 51:75,51:79
++-----	-----	-----++	-----+	-----+	-----+	-----+	-----	51:75,51:85 = 51:75,51:87

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++-----	-----	-----++	----+---	-----+	-----	-----++	-----+-	51:75,51:89 = 51:75,51:91
++-----	-----	-----++	----+---	-----+	-----	-----++	-----	51:01,51:75 = 51:01:08,51:75 =
								51:75,51:75
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:78,51:80 = 51:79,51:80
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:78,51:83 = 51:79,51:83
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:78,51:84 = 51:79,51:84
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:78,51:87 = 51:79,51:85 =
								51:79,51:87
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:78,51:86 = 51:79,51:86
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:78,51:91 = 51:79,51:89 =
								51:79,51:91
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:66,51:78 = 51:66,51:79
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:01,51:78 = 51:01,51:79 =
								51:01:08,51:79 = 51:78,51:79 =
								51:79,51:79
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:80,51:85 = 51:80,51:87
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:80,51:89 = 51:80,51:91
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:01,51:80 = 51:01:08,51:80 =
								51:80,51:80
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:83,51:85 = 51:83,51:87
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:83,51:89 = 51:83,51:91
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:01,51:83 = 51:01:08,51:83 =
								51:83,51:83
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:84,51:85 = 51:84,51:87
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:84,51:89 = 51:84,51:91
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:01,51:84 = 51:01:08,51:84 =
								51:84,51:84
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:85,51:86 = 51:86,51:87
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:85,51:89 = 51:85,51:91 =
								51:87,51:89 = 51:87,51:91
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:66,51:85 = 51:66,51:87
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:01,51:85 = 51:01,51:87 =
								51:01:08,51:87 = 51:85,51:87 =
								51:87,51:87
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:86,51:89 = 51:86,51:91
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:01,51:86 = 51:01:08,51:86 =
								51:86,51:86
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:66,51:89 = 51:66,51:91
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:01,51:89 = 51:01,51:91 =
								51:01:08,51:89 = 51:01:08,51:91
								= 51:89,51:91 = 51:91,51:91
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:01,51:66 = 51:01:08,51:66 =
								51:66,51:66
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:01,51:01 = 51:01,51:01:08
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:01:08,51:85 = 51:85,51:85
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:05,51:44N = 51:44N,51:54
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:05,51:20 = 51:20,51:54
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:05,51:08 = 51:08,51:54
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:05,51:10 = 51:10,51:54
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:02:02,51:10 = 51:09:02,51:10
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:02,51:10 = 51:09:01,51:10 =
								51:10,51:40 = 51:10,51:73
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:10,51:31 = 51:10,51:34
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:05,51:36 = 51:36,51:54
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:09:01,51:36 = 51:36,51:40 =
								51:36,51:73
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:15,51:31 = 51:15,51:34
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:05,51:31 = 51:05,51:34 =
								51:31,51:54 = 51:34,51:54
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:02,51:93 = 51:02:02,51:31 =
								51:09:01,51:93 = 51:09:02,51:34
								= 51:40,51:93 = 51:73,51:93
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:02,51:31 = 51:09:01,51:34 =
								51:31,51:40 = 51:34,51:40 =
								51:34,51:73
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:31,51:93 = 51:34,51:93
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:05,51:93 = 51:54,51:93
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:02:02,51:93 = 51:09:02,51:93
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:05,51:19 = 51:19,51:54
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:02,51:19 = 51:19,51:40
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:02,51:15 = 51:09:01,51:15 =
								51:15,51:40 = 51:15,51:73
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:02:02,51:15 = 51:09:02,51:15
++-----	-----	-----++	----+---	-----+	-----	-----+	++-----	51:05,51:53 = 51:53,51:54

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+----+--	-----	-----++	----++--	-----+	+-----	+-----+	-----	51:05,51:23 = 51:23,51:54
+----+--	-----	-----++	----++--	-----+	-----	-----+	-----	51:09:01,51:23 = 51:23,51:40 = 51:23,51:73
+----+--	-----	-----++	----++--	-----+	+-----	+-----+	-----	51:05,51:59 = 51:54,51:59
+----+--	-----	-----++	----++--	-----+	+-----	+-----+	-----	51:05,51:81 = 51:54,51:81
+----+--	-----	-----++	----++--	-----+	+-----	+-----+	-----	51:02,51:05 = 51:02,51:54 = 51:05,51:09:01 = 51:05,51:40 = 51:05,51:73 = 51:09:01,51:54 = 51:40,51:54
+----+--	-----	-----++	----++--	-----+	-----	+-----+	-----	51:02,51:09:02 = 51:02:02,51:09:01 = 51:02:02,51:40 = 51:02:02,51:73 = 51:09:02,51:40
+----+--	-----	-----++	----++--	-----+	-----	-----+	-----	51:02,51:09:01 = 51:02,51:40 = 51:02,51:73 = 51:09:01,51:40 = 51:40,51:40 = 51:40,51:73
+----+--	-----	-----++	----++--	-----+	+-----	+-----+	-----	51:02:02,51:05 = 51:02:02,51:54 = 51:05,51:05 = 51:05,51:09:02 = 51:05,51:54 = 51:09:02,51:54
+----+--	-----	-----++	----++--	-----+	-----	-----+	-----	51:02,51:23 = 51:23,51:23
+----+--	+-----	+-----++	----++--	-----+	-----	-----+	-----	51:09:01,51:44N = 51:44N,51:73
+----+--	+-----	+-----++	----++--	-----+	-----+	-----+	-----	51:09:01,51:20 = 51:20,51:73
+----+--	+-----	+-----++	----++--	-----+	-----	-----+	-----	51:08,51:09:01 = 51:08,51:73
+----+--	+-----	+-----++	----++--	-----+	-----	-----+	-----	51:09:01,51:31 = 51:31,51:73
+----+--	+-----	+-----++	----++--	-----+	-----	-----+	-----	51:09:01,51:19 = 51:19,51:19 = 51:19,51:73
+----+--	-----	-----++	+----++--	-----+	-----	-----+	-----	51:09:01,51:53 = 51:53,51:73
+----+--	-----	-----++	----++--	-----+	-----	-----+	-----	51:09:01,51:59 = 51:59,51:73
+----+--	-----	-----++	----++--	-----+	-----	-----+	-----	51:09:01,51:42 = 51:42,51:73
+----+--	-----	-----++	----++--	-----+	-----	+-----+	-----	51:09:01,51:09:02 = 51:09:02,51:73
+----+--	-----	-----++	----++--	-----+	-----	+-----+	-----	51:09:01,51:81 = 51:73,51:81
+----+--	-----	-----++	----++--	-----+	-----	-----+	-----	51:09:01,51:09:01 = 51:09:01,51:73
+-----	+-----	+-----++	----++--	-----+	-----	-----+	-----	51:08,51:44N = 51:44N,51:44N
+-----	+-----	+-----++	----++--	-----+	-----+	-----+	-----	51:08,51:20 = 51:20,51:20

- 51:01 = 51:01:01, 51:01:03-51:01:07, 51:01:10-51:01:14 and 51:01:16-51:01:17
- 51:01:08 = 51:01:08 and 51:01:15
- 51:02 = 51:02:01 and 51:02:03-51:02:04
- 51:13 = 51:13:01-51:13:02
- 51:24 = 51:24:02-51:24:03
- 51:51 = 51:51 and 51:76
- 51:66 = 51:66 and 51:67
- 51:68 = 51:68 and 51:72
- 51:70 = 51:70 and 51:71
- 51:75 = 51:75 and 51:77
- 51:83 = 51:83 and 51:88
- 51:84 = 51:84 and 51:94
- 51:86 = 51:86 and 51:95



SPECIFICITY TABLE

HLA-B*51 SSP subtyping

Specificities and sizes of the PCR products of the 64 primer mixes used for HLA-B*51 SSP subtyping

Primer Mix	Size of spec. PCR product ¹	Size of control band ²	Amplified HLA-B*51 alleles ³	Other amplified HLA-B alleles ⁴
1⁵	105 bp	800 bp	*51:01:01-51:06, 51:08-51:21, 51:23-51:24:03, 51:26-51:46, 51:48-51:95	*08:32, 18:07:01-18:07:02, 18:29, 35:01:01-35:08:01, 35:08:03-35:18, 35:21-35:24:02, 35:27, 35:29-35:45, 35:48, 35:50-35:62, 35:64-35:71, 35:74-35:75, 35:77, 35:79-35:81, 35:83-35:84, 35:86-35:94, 35:96-35:99, 37:21, 38:06-38:07, 44:06, 52:06:01-52:06:02, 53:01:01-53:08:02, 53:10-53:16, 53:18-53:23, 78:01-78:02:02, 78:04, 78:07
2⁵	95 bp	1070 bp	*51:01:01-51:01:17, 51:03-51:04, 51:06-51:07:02, 51:11N-51:14, 51:16-51:18, 51:21-51:22, 51:24:01-51:24:03, 51:26-51:30, 51:32-51:33, 51:35, 51:37-51:39, 51:41N, 51:43, 51:45-51:46, 51:48-51:52, 51:55-51:58, 51:60-51:72, 51:74-51:80, 51:82-51:92, 51:94-51:95	*14:01-14:18, 15:37-15:38:02, 18:15, 18:19, 18:30, 35:21, 35:96, 40:28, 40:51, 49:09, 52:01:01-52:02, 52:04-52:09, 52:12-52:18, 52:20, 53:06, 56:05:01-56:06, 56:21, 58:08, 78:01-78:03, 78:05-78:07, C*01:30
3⁶	265 bp	1070 bp	*51:02:01-51:02:04, 51:05, 51:10, 51:15, 51:23, 51:34, 51:36, 51:40, 51:54, 51:93	*07:78, 07:84, 08:09, 13:02:01-13:04, 13:08Q-13:09, 13:14, 13:16, 13:18-13:19, 13:27, 13:30-13:35, 13:37, 15:04, 15:16, 15:42, 15:67, 15:83, 15:95, 15:137, 15:155, 27:14, 35:37, 35:60, 39:06:01-39:06:02, 39:33-39:34, 39:50, 39:57, 40:06:01:01-40:06:02, 40:44,

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				40:53, 40:70, 40:75, 40:83, 40:86, 40:93, 40:95-40:96, 41:01, 41:05-41:07, 41:09, 41:12, 42:04, 44:15, 44:18, 44:20, 44:47, 45:01-45:11, 46:11, 46:18, 49:01:01-49:08, 49:10, 50:01:01-50:02, 50:04-50:09, 52:03, 52:11, 54:01-54:05N, 54:07-54:08N, 54:10-54:22, 55:01:01-55:02:02, 55:02:04-55:03, 55:05, 55:07, 55:09-55:13, 55:15-55:40, 56:01:01-56:01:04, 56:07-56:08, 56:13-56:17, 56:19N-56:20, 56:22-56:29, 59:01-59:05, 78:04
4	255 bp	1070 bp	*51:03	
5	270 bp	1070 bp	*51:04, 51:46, 51:56	*14:10, 18:22, 35:21, 35:24:01-35:24:02, 35:81, 35:96, 37:04:01-37:04:02, 40:28, 53:02, 53:06, 57:14, 58:09
6	210 bp	800 bp	*51:05 ^W , 51:09:01-51:10, 51:15, 51:19, 51:31, 51:40, 51:54 ^W , 51:73, 51:93	*13:02:01-13:04, 13:08Q-13:09, 13:14-13:15, 13:18 ^W , 13:19, 13:27, 13:30, 13:32-13:35, 13:37, 15:155, 27:14, 35:37, 35:60, 39:06:01-39:06:02, 39:33 ^W , 39:34, 39:50, 39:57, 40:06:01:01-40:06:02, 40:44, 40:53, 40:70, 40:75, 40:83, 40:86, 40:93, 40:96, 44:47, 46:11, 46:18, 52:03, 52:10, 54:01-54:05N, 54:07-54:08N, 54:10 ^W , 54:11-54:19, 54:21-54:22, 55:02:01-55:02:05, 55:07, 55:10, 55:12-55:13, 55:16, 55:18-55:19, 55:22-55:23, 55:26-55:27, 55:30, 55:32, 55:34-55:35, 55:37 ^W , 55:39, 56:01:01-56:01:04, 56:07-56:08, 56:14-56:17, 56:19N-56:20, 56:22-56:24, 56:26-56:29, 59:01-59:05, 73:01, 78:04
7	270 bp	1070 bp	*51:06, 51:45, 51:62, 51:64	*14:01-14:09, 14:11-14:18, 15:37-15:38:02, 15:185, 18:01:01-18:09, 18:12-18:15,

				18:17N-18:20, 18:23N-18:34, 18:36-18:38, 18:40-18:49, 27:28, 27:62, 39:32, 39:43, 39:48, 40:51, C*01:30
8⁵	105 bp	800 bp	*51:07:01-51:07:02	*18:01:01-18:06, 18:08-18:15, 18:17N-18:28, 18:30-18:32, 18:34-18:36, 18:38-18:47, 18:49, 35:20:01-35:20:02, 35:28, 35:72, 35:95, 37:01:01-37:01:05, 37:01:07-37:05, 37:07-37:20, 37:22, 44:83, 49:03, 52:01:01-52:01:05, 52:03-52:05, 52:07-52:15, 52:17-52:20, 53:09, 53:17, 78:05-78:06
9^{5,6,8}	85 bp, 195 bp, 215 bp	1070 bp	*51:08, 51:17, 51:20, 51:35, 51:44N	*37:04:01-37:04:02, 52:19
10⁹	160 bp, 245 bp	1070 bp	*51:01:09, 51:10, 51:21, 51:24:02-51:24:03, 51:36	*07:78, 07:84, 08:09, 15:42, 15:83, 27:14, 35:60, 39:06:01-39:06:02, 39:34, 39:57, 40:06:01:01-40:06:02, 40:44, 40:53, 40:70, 40:75, 40:83, 40:86, 40:93, 40:96, 41:01, 41:05-41:07, 41:09, 41:12, 42:04, 45:08, 46:18, 54:01-54:02, 54:04-54:05N, 54:07-54:08N, 54:10-54:22, 55:01:01-55:03, 55:05, 55:07, 55:10-55:13, 55:15-55:21, 55:23, 55:25-55:40, 56:23, 59:01-59:03, 59:05, 73:01, 78:07
11	245 bp	1070 bp	*51:10, 51:16, 51:31, 51:34, 51:82, 51:93	*07:78, 07:84, 13:02:01-13:02:07, 13:08Q-13:09, 13:14-13:16, 13:18-13:19, 13:27, 13:30-13:35, 13:37, 27:14, 39:50, 40:06:01:01-40:06:02, 40:44, 40:53, 40:70, 40:75, 40:83, 40:86, 40:93, 40:95-40:96, 45:10, 49:07, 52:08, 55:09, 55:22, 55:24, 73:01
12	495 bp	1070 bp	*51:11N	
13	200 bp	1070 bp	*51:12	
14⁵	105 bp	1070 bp	*51:13:01-51:13:02,	*15:137, 39:06:01-39:06:02,

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			51:92	39:33-39:34, 39:50, 39:57, 40:86, 45:02, 50:09, 52:14, 55:13, 56:22, 59:03, 73:01
15^{5,10}	100 bp, 230 bp	800 bp	*51:14, 51:19	*39:06:01-39:06:02, 39:57
16	180 bp	1070 bp	*51:15, 51:18, 51:35, 51:62	*13:03, 15:73, 40:71, 44:10, 44:15, 44:18, 45:01, 45:04- 45:07, 45:11, 46:11, 49:01:01-49:03, 49:06, 49:08- 49:10, 50:01:01-50:02, 50:04- 50:08, 54:03, 56:01:01-56:02, 56:04, 56:07-56:08, 56:13- 56:14, 56:16-56:17, 56:20, 56:24-56:29, 59:04, 82:01- 82:03
17⁵	105 bp	800 bp	*51:22	*18:33, 35:82, 35:85, 39:19:01-39:19:02, 78:03
18^{5,11}	140 bp, 220 bp	800 bp	*51:08, 51:20, 51:28, 51:36, 51:44N	*08:09, 15:83, 41:01, 41:05- 41:07, 41:09, 41:12, 42:04, 44:15, 44:18, 44:20, 45:01- 45:11, 52:19, 55:20, 56:13
19⁵	145 bp	800 bp	*51:10, 51:24:01- 51:24:03	*07:78, 07:84, 08:09, 40:06:01:01-40:06:02, 40:44, 40:53, 40:70, 40:75, 40:83, 40:86, 40:93, 40:96, 41:01, 41:05-41:07, 41:09, 41:12, 42:04, 54:11, 55:20, 56:20, 59:02, 73:01
20⁵	110 bp	1070 bp	*51:26	
21^{5,12}	130 bp, 185 bp	1070 bp	*51:27N, 51:38	
22	160 bp	1070 bp	*51:01:01, 51:01:03- 51:01:08, 51:01:10- 51:02:01, 51:02:03- 51:04, 51:06- 51:07:01, 51:08- 51:09:01, 51:10- 51:14, 51:16- 51:24:03, 51:26- 51:46, 51:48-51:53, 51:55-51:88, 51:90- 51:92, 51:94-51:95	*07:65 ^w , 18:04, 35:42:02, 44:06, 53:06, 56:05:01 ^w , 56:06 ^w , 78:01, 78:02:02- 78:03, 78:07
23	210 bp	1070 bp		*07:65, 18:04, 35:42:02, 40:58, 56:05:01, 56:06, 78:01, 78:02:02-78:03, 78:07
24	210 bp	1070 bp	*51:01:01, 51:01:03- 51:01:08, 51:01:10-	*44:06, 49:03, 52:01:02, 52:01:04, 52:02-52:03,

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			51:02:01, 51:02:03-51:04, 51:06-51:07:01, 51:08-51:09:01, 51:10-51:14, 51:16-51:24:03, 51:26-51:42, 51:43 ^w , 51:44N-51:46, 51:48-51:53, 51:55-51:77, 51:79-51:88, 51:90-51:92, 51:94-51:95	52:06:01-52:06:02, 52:09, 53:06, 58:08
25 ^{5,7,13}	130 bp, 175 bp, 205 bp	800 bp	*51:30, 51:38, 51:53	
26 ^{5,14}	105 bp, 155 bp	1070 bp	*51:13:01-51:13:02, 51:32, 51:37, 51:63, 51:92	*13:04, 15:04, 15:16, 15:67, 15:95, 15:137, 15:155, 35:37, 39:06:01-39:06:02, 39:33-39:34, 39:50, 39:57, 40:86, 45:02, 45:09, 49:04-49:05, 50:09, 52:14, 54:14, 55:13, 55:23, 55:32, 56:22, 59:03, 73:01
27 ¹⁵	205 bp, 270 bp, 345 bp	800 bp	*51:04, 51:33, 51:39, 51:46, 51:56	*14:10, 18:22, 35:21, 35:24:01-35:24:02, 35:81, 35:96, 37:04:01-37:04:02, 40:28, 44:24, 53:02, 53:06, 57:14, 58:09
28 ¹⁶	205 bp, 255 bp	1070 bp	*51:23, 51:33	*44:15, 44:18, 44:20, 44:47, 45:01-45:03, 45:05-45:07, 45:09, 45:11, 50:02, 52:15
29	245 bp	1070 bp	*51:01:01-51:03, 51:05, 51:07:01-51:09:02, 51:11N-51:15, 51:17-51:20, 51:22-51:24:03, 51:26-51:30, 51:32-51:33, 51:35, 51:37-51:41N, 51:43-51:44N, 51:48-51:55, 51:57-51:58, 51:60-51:61, 51:63, 51:65-51:80, 51:83-51:92, 51:94-51:95	*13:03-13:04, 15:04, 15:16, 15:67, 15:95, 15:137, 15:155, 35:37, 39:33, 44:15, 44:18, 44:20, 44:47, 45:01-45:07, 45:09, 45:11, 46:11, 49:01:01-49:06, 49:08-49:10, 50:01:01-50:02, 50:04-50:09, 52:01:01-52:07, 52:09-52:20, 54:03, 56:01:01-56:01:04, 56:05:01-56:08, 56:13-56:17, 56:20-56:22, 56:24-56:29, 58:08, 59:04, 78:01-78:06
30 ⁵	105 bp	800 bp	*51:06, 51:56, 51:59, 51:64	*07:02:11, 07:05:03, 15:01:02, 15:09, 40:01:06, 40:26, 44:62

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31 ^{5,17}	105 bp, 225 bp	1070 bp	*51:05, 51:13:01- 51:13:02, 51:29, 51:37, 51:54, 51:61, 51:63, 51:82, 51:92	*07:78, 07:84, 13:04, 13:18, 13:31, 15:04, 15:16, 15:67, 15:95, 15:137, 15:155, 35:37, 39:06:01-39:06:02, 39:33- 39:34, 39:50, 39:57, 40:86, 45:02, 45:09, 49:04-49:05, 50:09, 52:14, 54:10, 54:14, 54:20, 55:09, 55:13, 55:21, 55:23, 55:32, 55:37, 56:22, 59:03, 73:01
32	165 bp	1070 bp	*51:16, 51:31, 51:34, 51:82, 51:93	*07:02:11, 07:05:03, 27:04:03, 40:01:06, 40:95, 52:08
33	195 bp	1070 bp	*51:41N	
34	260 bp	1070 bp	*51:42	*35:45, 35:71, 44:02:01:01- 44:02:07, 44:02:09-44:14, 44:17, 44:19N, 44:21-44:30, 44:32-44:36, 44:38-44:40, 44:43-44:46, 44:48-44:53, 44:55-44:63, 44:66-44:90, 44:92-44:98, 53:22, 57:07, 83:01, C*15:25
35	225 bp	1070 bp		*08:49, 08:60, 35:38, 37:01:01-37:01:07, 37:03N- 37:06, 37:08, 37:10-37:22, 42:13, 44:02:01:01-44:02:13, 44:05:01-44:06, 44:08-44:09, 44:11-44:12, 44:14, 44:16- 44:17, 44:19N, 44:21-44:25, 44:27, 44:33-44:34, 44:42, 44:44, 44:48-44:49, 44:51- 44:53, 44:55, 44:58N-44:59, 44:62-44:63, 44:66-44:68, 44:70-44:75, 44:78, 44:80, 44:83-44:84, 44:86-44:91, 44:93, 44:95, 44:97, 53:22, 57:09, 57:24, 83:01, C*15:25
36	215 bp	1070 bp	*51:43	
37 ¹⁸	165 bp, 225 bp	1070 bp	*51:44N, 51:55	
38	205 bp	1070 bp	*51:37, 51:45, 51:63	*15:38:01-15:38:02, 15:185, 18:01:01-18:09, 18:12-18:15, 18:17N-18:20, 18:22-18:25, 18:27-18:34, 18:36-18:40, 18:42-18:49, 35:21, 35:24:01- 35:24:02, 39:43, 53:02, 53:06, 57:14, 58:09

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39	250 bp	1070 bp	*51:46, 51:64-51:65	*14:05, 14:13, 18:14
40	185 bp	1070 bp	*51:01:01-51:24:03, 51:26-51:46, 51:48- 51:53, 51:55-51:59, 51:61-51:72, 51:74- 51:77, 51:79-51:95	*07:36, 07:38, 07:81, 15:13, 15:17:01:01-15:17:02, 15:24, 15:87, 15:157, 15:162, 15:168, 15:177, 44:06, 48:18, 49:03, 52:01:01-52:19, 53:01:01-53:02, 53:04- 53:08:02, 53:10, 53:14-53:23, 57:01:01-57:11, 57:13-57:31, 58:01:01-58:02, 58:04-58:16, 58:18-58:28
41¹⁹	225 bp, 315 bp	1070 bp	*51:05, 51:29, 51:48, 51:54, 51:61, 51:82	*07:78, 07:84, 13:18, 13:31, 15:04, 15:137, 39:33, 54:10, 54:20, 55:09, 55:21, 55:37, C*08:24
42^{5,20}	100 bp, 135 bp	800 bp	*51:49, 51:60	
43^{5,21}	115 bp, 215 bp	800 bp	*51:50, 51:58	
44²²	280 bp, 385 bp	800 bp	*51:51, 51:76	*08:39
45	190 bp	1070 bp	*51:52	
46⁵	80 bp	800 bp	*51:57	
47⁵	125 bp	800 bp	*51:20	*07:65, 08:32, 18:03, 35:29, 35:69, 35:76, 39:19:01- 39:19:02, 53:23, 56:06, 78:01, 78:03, 78:07
48^{5,23}	95 bp, 220 bp	1070 bp	*51:37, 51:61, 51:90, 51:92	*07:84, 13:04, 13:31, 13:35, 15:04, 15:16, 15:67, 15:95, 15:137, 15:155, 35:37, 40:44, 44:20, 44:47, 45:09, 49:04- 49:05, 52:12, 54:14-54:16, 55:21, 55:23, 55:27
49	160 bp	1070 bp	*51:01:02, 51:01:09, 51:02:02, 51:05, 51:07:02, 51:09:02, 51:15, 51:54, 51:93	*07:56, 07:72, 08:26, 08:56, 15:02:01-15:02:04, 15:08, 15:11:01-15:11:04, 15:13, 15:15, 15:21, 15:31, 15:44, 15:55, 15:76, 15:88-15:89, 15:112, 15:121, 15:139, 15:143-15:144, 15:148, 15:170, 15:189, 15:191, 18:29, 35:01:01-35:09:02, 35:11-35:12:02, 35:14:01- 35:15, 35:17-35:24:02, 35:26- 35:27, 35:29-35:42:01, 35:43- 35:62, 35:64-35:68:02, 35:70-

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				35:72, 35:74-35:79, 35:81-35:83, 35:85-35:89, 35:91-35:99, 53:01:01-53:05, 53:07-53:16, 53:18-53:23, 54:01-54:20, 54:22, 55:01:01-55:05, 55:07-55:09, 55:11-55:17, 55:19-55:33, 55:35, 55:37-55:39, 56:01:01-56:04, 56:05:02, 56:07, 56:09-56:13, 56:15, 56:17-56:29, 59:01-59:05, 78:02:01, 78:04
50	155 bp	1070 bp	*51:81	*07:02:01-07:02:13, 07:02:15-07:06, 07:08-07:11, 07:13, 07:15-07:17, 07:19-07:21, 07:23-07:67N, 07:69-07:76, 07:79-07:83, 07:85-07:99, 08:01:02, 08:06, 08:20, 27:07, 27:11, 27:24, 27:32-27:34, 27:43, 35:31, 37:07, 37:09, 40:02:01-40:03, 40:05, 40:08-40:09, 40:13, 40:15-40:16, 40:18-40:19, 40:24, 40:27, 40:29, 40:31-40:32, 40:35, 40:37, 40:39-40:40, 40:45, 40:50, 40:56-40:58, 40:80, 40:82, 40:85, 40:89-40:91, 40:94, 40:97-40:98, 48:01:01-48:01:02, 48:04-48:11, 48:13, 48:15-48:16, 48:18-48:20, 48:22, 55:04, 58:27, 81:01-81:04N, C*03:05, C*03:25, C*03:27, C*08:08
51^{5,24}	85 bp, 215 bp	800 bp	*51:68, 51:72	
52	150 bp	1070 bp	*51:69	
53²⁵	165 bp, 260 bp	1070 bp	*51:70-51:71	
54⁵	120 bp	1070 bp	*51:74	*35:46-35:47, 40:07-40:08, 40:13, 40:68
55^{5,26}	75 bp, 200 bp	1070 bp	*51:75, 51:77	
56	380 bp	1070 bp	*51:01:01-51:01:07, 51:01:09-51:01:14, 51:01:16-51:12, 51:16-51:24:03, 51:26-51:36, 51:38-51:41N, 51:43-	*08:03, 08:52, 40:13, 40:19, 48:18, 52:01:01-52:11, 52:13, 52:15-52:19, 53:19, 56:21, 57:02:01-57:03:02, 57:05, 57:07, 57:09, 57:17, 58:08, 58:27-58:28, 59:02

			51:44N, 51:46, 51:48-51:49, 51:51- 51:53, 51:55-51:61, 51:64-51:77, 51:79- 51:84, 51:86-51:89, 51:91, 51:93-51:95	
57 ^{5,27}	145 bp, 210 bp	1070 bp	*51:78-51:79	*44:02:10, 44:34
58	165 bp	1070 bp	*51:80	
59 ^{5,28}	120 bp, 240 bp	1070 bp	*51:83, 51:88	
60 ^{5,29}	85 bp, 190 bp	1070 bp	*51:84, 51:94	
61 ^{5,30}	100 bp, 210 bp	1070 bp	*51:85, 51:87	*27:14, 44:20, 44:47
62 ³¹	175 bp, 250 bp	1070 bp	*51:86, 51:95	*39:57
63 ^{5,32}	70 bp, 175 bp	1070 bp	*51:89, 51:91	
64 ^{5,33}	115 bp, 170 bp	1070 bp	*51:66-51:67	

¹Alleles are assigned by the presence of specific PCR product(s). However, the sizes of the specific PCR products may be helpful in the interpretation of HLA-B*51 SSP typings.

When the primers in a primer mix can give rise to specific PCR products of more than one length this is indicated if the size difference is 20 base pairs or more. Size differences shorter than 20 base pairs are not given. For high resolution SSP kits the respective lengths of the specific PCR product(s) of the alleles amplified by these primer mixes are given.

Nonspecific amplifications, i.e. a ladder or a smear of bands, may sometimes be seen. GC-rich primers, e.g. the primers in wells number 4, 5, 6, 7, 8, 9, 15, 17, 18 and 19 have a higher tendency of giving rise to nonspecific amplifications than other primers.

PCR fragments longer than the control bands may sometimes be observed. Such bands should be disregarded and do not influence the interpretation of the SSP typings.

PCR fragments migrating faster than the control bands, but slower than a 400 bp fragment may be seen in some gel read-outs. Such bands can be disregarded and do not influence the interpretation of the SSP typings.

Some primers may give rise to primer oligomer artifacts. Sometimes this phenomenon is an inherent feature of the primer pair(s) of a primer mix. More often it is due to other factors such as too low amount of DNA in the PCR reactions, taking too long time in setting up the PCR reactions, working at elevated room temperature or using thermal cyclers that are not pre-heated.

²The internal positive control primer pairs amplify segments of the human growth hormone gene. The two different control primer pairs give rise to either an internal positive control band of 1070 base pairs, for most wells, or a band of 800 base pairs, for some wells.

Well number 1 contains the primer pair giving rise to the shorter, 800 bp, internal positive control band in order to help in the correct orientation of the HLA-B*51 subtyping.

In addition, wells number 6, 8, 15, 17 to 19, 25, 27, 30, 42 to 44, 46, 47 and 51 contain the primer pair giving rise to the shorter, 800 bp, internal positive control band in order to allow kit identification.

In the presence of a specific amplification the intensity of the control band often decreases.

³For several HLA-B alleles fourth exon nucleotide sequences are not available. In these instances it is not known whether some of the primers of the SSP sets are completely matched with the target sequences or not. We assume that unknown sequences in the fourth exon are conserved within allelic groups.

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The B*51:51 and 51:76 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 44.

The B*51:66 and 51:67 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 64.

The B*51:68 and 51:72 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 51.

The B*51:70 and 51:71 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 53.

The B*51:75 and 51:77 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 55.

The B*51:83 and 51:88 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 59.

The B*51:84 and 51:94 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 60.

The B*51:86 and 51:95 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 62.

⁴Due to the sharing of sequence motifs between HLA-B alleles non-HLA-B*51 alleles will be amplified by many the HLA-B*51 primer mixes.

⁵Short specific PCR fragments are less intense and not as sharp as longer specific bands.

⁶Primer mixes 3 and 9 may give a lower yield of specific PCR product than the other HLA-B*51 mixes.

⁷Primer mix 25 has a tendency to giving rise to nonspecific amplifications.

⁸Primer mix 9: Specific PCR fragment of 85 bp in the B*51:08, 51:20 and 51:44N and in the B*37:04:01-37:04:02 and 52:19 alleles. Specific PCR fragment of 195 bp in the B*51:35 allele. Specific PCR fragment of 215 bp in the B*51:17 allele.

⁹Primer mix 10: Specific PCR fragment of 160 bp in the B*51:01:09, 51:10 and 51:24:02-51:24:03 and in the B*07:78, 07:84, 27:14, 40:06:01:01-40:06:02, 40:44, 40:53, 40:70, 40:75, 40:83, 40:86, 40:93, 40:96 and 73:01 alleles. Specific PCR fragment of 245 bp in the B*51:21, 51:36, 08:09, 15:42, 15:83, 35:60, 39:06:01-39:06:02, 39:34, 39:57, 41:01, 41:05-41:07, 41:09, 41:12, 42:04, 45:08, 46:18, 54:01-54:02, 54:04-54:05N, 54:07-54:08N, 54:10, 54:12-54:22, 55:01:01-55:03, 55:05, 55:07, 55:10-55:13, 55:15-55:21, 55:23, 55:25-55:40, 56:23, 59:01-59:03, 59:05 and 78:07 alleles. Specific PCR fragment of 160 and 245 bp in the B*54:11 allele.

¹⁰Primer mix 15: Specific PCR fragment of 100 bp in the B*51:14 allele. Specific PCR fragment of 230 bp in the B*51:19 and in the B*39:06:01-39:06:02 and 39:57 alleles.

¹¹Primer mix 18: Specific PCR fragment of 140 bp in the B*51:28 allele. Specific PCR fragment of 220 bp in the B*51:08, 51:20, 51:36 and 51:44N and in the B*08:09, 15:83, 41:01, 41:05-41:07, 41:09, 41:12, 42:04, 44:15, 44:18, 44:20, 45:01-45:11, 52:19, 55:20 and 56:13 alleles.

¹²Primer mix 21: Specific PCR fragment of 130 bp in the B*51:38 allele. Specific PCR fragment of 185 bp in the B*51:27N allele.

¹³Primer mix 25: Specific PCR fragment of 130 bp in the B*51:38 allele. Specific PCR fragment of 175 bp in the B*51:30 allele. Specific PCR fragment of 205 bp in the B*51:53 allele.

¹⁴Primer mix 26: Specific PCR fragment of 105 bp in the B*51:13:01-51:13:02, 51:37, 51:63 and 51:92 and in the B*13:04, 15:04, 15:16, 15:67, 15:95, 15:137, 15:155, 35:37, 39:06:01-39:06:02, 39:33-39:34, 39:50, 39:57, 40:86, 45:02, 45:09, 49:04-49:05, 50:09, 52:14, 54:14, 55:13, 55:23, 55:32, 56:22, 59:03 and 73:01 alleles. Specific PCR fragment of 155 bp in the B*51:32 allele.

¹⁵Primer mix 27: Specific PCR fragment of 205 bp in the B*51:33 allele. Specific PCR fragment of 270 bp in the B*51:04, 51:46 and 51:56 and in the B*14:10, 18:22, 35:21, 35:24:01-35:24:02, 35:81, 35:96, 37:04:01-37:04:02, 40:28, 53:02, 53:06, 57:14 and 58:09 alleles. Specific PCR fragment of 345 bp in the B*51:39 and B*44:24 alleles.

¹⁶Primer mix 28: Specific PCR fragment of 205 bp in the B*51:33 allele. Specific PCR fragment of 255 bp in the B*51:23 and in the B*44:15, 44:18, 44:20, 44:47, 45:01-45:03, 45:05-45:07, 45:09, 45:11, 50:02 and 52:15 alleles.

¹⁷Primer mix 31: Specific PCR fragment of 105 bp in the B*51:13:01-51:13:02, 51:37, 51:63, 51:92, 13:04, 15:16, 15:67, 15:95, 15:155, 35:37, 39:06:01-39:06:02, 39:34, 39:50, 39:57, 40:86, 45:02, 45:09, 49:04-49:05, 50:09, 52:14, 54:14, 55:13, 55:23, 55:32, 56:22, 59:03, 73:01 alleles. Specific PCR fragment of 225 bp in the B*51:05, 51:29, 51:54, 51:61 and 51:82 and in the B*07:78, 07:84, 13:18, 13:31, 54:10, 54:20, 55:09, 55:21 and 55:37 alleles. Specific PCR fragment of 105 and 225 bp in the B*15:04, 15:137 and 39:33 alleles.

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¹⁸Primer mix 37: Specific PCR fragment of 165 bp in the B*51:44N allele. Specific PCR fragment of 225 bp in the B*51:55 allele.

¹⁹Primer mix 41: Specific PCR fragment of 225 bp in the B*51:05, 51:29, 51:54, 51:61 and 51:82 and in the B*07:78, 07:84, 13:18, 13:31, 15:04, 15:137, 39:33, 54:10, 54:20, 55:09, 55:21 and 55:37 alleles. Specific PCR fragment of 315 bp in the B*51:48 and C*08:24 alleles.

²⁰Primer mix 42: Specific PCR fragment of 100 bp in the B*51:60 allele. Specific PCR fragment of 135 bp in the B*51:49 allele.

²¹Primer mix 43: Specific PCR fragment of 115 bp in the B*51:58 allele. Specific PCR fragment of 215 bp in the B*51:50 allele.

²²Primer mix 44: Specific PCR fragment of 280 bp in the B*51:76 and B*08:39 alleles. Specific PCR fragment of 385 bp in the B*51:51 allele.

²³Primer mix 48: Specific PCR fragment of 95 bp in the B*51:37, 51:90 and 51:92 and in the B*07:84, 13:04, 13:35, 15:16, 15:67, 15:95, 15:155, 35:37, 40:44, 44:20, 44:47, 45:09, 49:04-49:05, 52:12, 54:14-54:16, 55:23 and 55:27 alleles. Specific PCR fragment of 220 bp in the B*51:61 and in the B*13:31, 15:137 and 55:21 alleles. Specific PCR fragment of 95 and 220 bp in the B*15:04 allele.

²⁴Primer mix 51: Specific PCR fragment of 85 bp in the B*51:68 allele. Specific PCR fragment of 215 bp in the B*51:72 allele.

²⁵Primer mix 53: Specific PCR fragment of 165 bp in the B*51:71 allele. Specific PCR fragment of 260 bp in the B*51:70 allele.

²⁶Primer mix 55: Specific PCR fragment of 75 bp in the B*51:77 allele. Specific PCR fragment of 200 bp in the B*51:75 allele.

²⁷Primer mix 57: Specific PCR fragment of 145 bp in the B*51:79 allele. Specific PCR fragment of 210 bp in the B*51:78 and in the B*44:02:10 and 44:34 alleles.

²⁸Primer mix 59: Specific PCR fragment of 120 bp in the B*51:83 allele. Specific PCR fragment of 240 bp in the B*51:88 allele.

²⁹Primer mix 60: Specific PCR fragment of 85 bp in the B*51:94 allele. Specific PCR fragment of 190 bp in the B*51:84 allele.

³⁰Primer mix 61: Specific PCR fragment of 100 bp in the B*51:85 and in the B*27:14, 44:20 and 44:47 alleles. Specific PCR fragment of 210 bp in the B*51:87 allele.

³¹Primer mix 62: Specific PCR fragment of 175 bp in the B*51:86 allele. Specific PCR fragment of 250 bp in the B*51:95 and in the B*39:57 alleles.

³²Primer mix 63: Specific PCR fragment of 70 bp in the B*51:91 allele. Specific PCR fragment of 175 bp in the B*51:89 allele.

³³Primer mix 64: Specific PCR fragment of 115 bp in the B*51:67 allele. Specific PCR fragment of 170 bp in the B*51:66 allele.

‘w’, might be weakly amplified.

INTERPRETATION TABLE																																	
HLA-B*51 SSP subtyping																																	
Amplification patterns of the B*51:01 to B*51:95 alleles																																	
	Well ³																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
Length of spec.	105	95	265	255	270	210	270	105	85	160	245	495	200	105	100	180	105	140	145	110	130	160	210	210	130	105	205	155	205	245	105	105	165
PCR product(s)									195	245	245	495			230	180		220	145		185			210	175	155	205	255		225			
Length of int. pos. control ¹	800	1070	1070	1070	1070	800	1070	800	1070	1070	1070	1070	1070	1070	800	1070	800	800	800	1070	1070	1070	1070	1070	800	1070	800	1070	1070	800	1070	1070	
Well No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
HLA-B allele ²																																	
*51:01:01, 51:01:03-51:01:07, 51:01:10-51:01:14, 51:01:16-51:01:17	1	2																				22	24						29				
*51:01:02	1	2																												29			
*51:01:08, 51:01:15	1	2																				22	24						29				
*51:01:09	1	2							10																					29			
*51:02:01, 51:02:03-51:02:04	1		3																			22	24						29				
*51:02:02	1		3																										29				
*51:03	1	2		4																		22	24						29				
*51:04	1	2			5																	22	24				27						
*51:05	1		3			w																							29	31			
*51:06	1	2					7															22	24						30				
*51:07:01		2						8														22	24						29				
*51:07:02		2						8																					29				
*51:08	1								9									18				22	24						29				
*51:09:01	1					6																22	24						29				
*51:09:02	1					6																							29				
*51:10	1		3			6				10	11								19			22	24										
*51:11N	1	2									12											22	24						29				
*51:12	1	2											13									22	24						29				
*51:13:01-51:13:02	1	2												14								22	24		26			29	31				
*51:14	1	2													15							22	24						29				
*51:15	1		3			6										16													29				
*51:16	1	2									11											22	24								32		
*51:17	1	2							9													22	24						29				
*51:18	1	2														16						22	24						29				
*51:19	1					6									15							22	24						29				
*51:20	1								9									18				22	24						29				
*51:21	1	2								10												22	24										
*51:22		2																17				22	24						29				
*51:23	1		3																			22	24					28	29				
*51:24:01	1	2																	19			22	24						29				
*51:24:02-51:24:03	1	2								10									19			22	24						29				
*51:26	1	2																		20		22	24						29				
*51:27N	1	2																				21	22	24					29				
*51:28	1	2																18				22	24						29				
*51:29	1	2																				22	24						29	31			
*51:30	1	2																				22	24	25					29				
*51:31	1					6					11											22	24								32		
*51:32	1	2																				22	24		26				29				
*51:33	1	2																				22	24				27	28	29				
*51:34	1		3								11											22	24								32		
*51:35	1	2							9							16						22	24						29				
*51:36	1		3							10								18				22	24										
*51:37	1	2																				22	24			26			29	31			
*51:38	1	2																				21	22	24	25				29				
Well No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	

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Well No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
*51:39	1	2																				22	24			27		29				
*51:40	1		3			6																22	24						29			
*51:41N	1	2																				22	24						29			
*51:42	1																					22	24									
*51:43	1	2																				22	w						29			
*51:44N	1								9									18				22	24						29			
*51:45	1	2					7															22	24									
*51:46	1	2			5																	22	24			27						
*51:48	1	2																				22	24						29			
*51:49	1	2																				22	24						29			
*51:50	1	2																				22	24						29			
*51:51, 51:76 ⁴	1	2																				22	24						29			
*51:52	1	2																				22	24						29			
*51:53	1																					22	24		25				29			
*51:54	1		3			w																							29	31		
*51:55	1	2																				22	24						29			
*51:56	1	2			5																	22	24			27			30			
*51:57	1	2																				22	24						29			
*51:58	1	2																				22	24						29			
*51:59	1																					22	24						30			
*51:60	1	2																				22	24						29			
*51:61	1	2																				22	24						29	31		
*51:62	1	2					7									16						22	24									
*51:63	1	2																				22	24			26			29	31		
*51:64	1	2					7															22	24						30			
*51:65	1	2																				22	24						29			
*51:66-51:67 ⁵	1	2																				22	24						29			
*51:68, 51:72 ⁶	1	2																				22	24						29			
*51:69	1	2																				22	24						29			
*51:70-51:71 ⁷	1	2																				22	24						29			
*51:73	1					6																22	24						29			
*51:74	1	2																				22	24						29			
*51:75, 51:77 ⁸	1	2																				22	24						29			
*51:78	1	2																				22							29			
*51:79	1	2																				22	24						29			
*51:80	1	2																				22	24						29			
*51:81	1																					22	24									
*51:82	1	2								11												22	24							31	32	
*51:83, 51:88 ⁹	1	2																				22	24						29			
*51:84, 51:94 ¹⁰	1	2																				22	24						29			
*51:85	1	2																				22	24						29			
*51:86, 51:95 ¹¹	1	2																				22	24						29			
*51:87	1	2																				22	24						29			
*51:89	1	2																				22	24						29			
*51:90	1	2																				22	24						29			
*51:91	1	2																				22	24						29			
*51:92	1	2													14							22	24			26			29	31		
*51:93	1		3			6					11																				32	
Well No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32

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33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	Well No.	
							40																56										*51:39
							40																56										*51:40
33							40																56										*51:41N
	34						40																										*51:42
			36				40																	56									*51:43
				37			40																	56									*51:44N
					38		40																										*51:45
						39	40																	56									*51:46
							40	41																56									*51:48
							40		42															56									*51:49
							40			43																							*51:50
							40				44													56									*51:51, 51:76 ⁴
							40					45												56									*51:52
							40																	56									*51:53
							40	41								49																	*51:54
				37			40																	56									*51:55
							40																	56									*51:56
							40					46												56									*51:57
							40			43														56									*51:58
							40																	56									*51:59
									42															56									*51:60
							40	41							48									56									*51:61
							40																										*51:62
						38	40																										*51:63
							39	40																56									*51:64
							39	40																56									*51:65
							40																	56					64				*51:66-51:67 ⁵
							40											51						56									*51:68, 51:72 ⁶
							40												52					56									*51:69
							40													53				56									*51:70-51:71 ⁷
							40																	56									*51:73
							40														54			56									*51:74
							40																55	56									*51:75, 51:77 ⁸
																								57									*51:78
							40																	56	57								*51:79
							40																	56		58							*51:80
							40									50								56									*51:81
							40	41																56									*51:82
							40																	56			59						*51:83, 51:88 ⁹
							40																	56			60						*51:84, 51:94 ¹⁰
							40																				61						*51:85
							40																	56					62				*51:86, 51:95 ¹¹
							40																	56			61						*51:87
							40																	56					63				*51:89
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Primer mix 28: Specific PCR fragment of 205 bp in the B*51:33 allele. Specific PCR fragment of 255 bp in the B*51:23 and in the B*44:15, 44:18, 44:20, 44:47, 45:01-45:03, 45:05-45:07, 45:09, 45:11, 50:02 and 52:15 alleles.

Primer mix 31: Specific PCR fragment of 105 bp in the B*51:13:01-51:13:02, 51:37, 51:63, 51:92, 13:04, 15:16, 15:67, 15:95, 15:155, 35:37, 39:06:01-39:06:02, 39:34, 39:50, 39:57, 40:86, 45:02, 45:09, 49:04-49:05, 50:09, 52:14, 54:14, 55:13, 55:23, 55:32, 56:22, 59:03, 73:01 alleles. Specific PCR fragment of 225 bp in the B*51:05, 51:29, 51:54, 51:61 and 51:82 and in the B*07:78, 07:84, 13:18, 13:31, 54:10, 54:20, 55:09, 55:21 and 55:37 alleles. Specific PCR fragment of 105 and 225 bp in the B*15:04, 15:137 and 39:33 alleles.

Primer mix 37: Specific PCR fragment of 165 bp in the B*51:44N allele. Specific PCR fragment of 225 bp in the B*51:55 allele.

Primer mix 41: Specific PCR fragment of 225 bp in the B*51:05, 51:29, 51:54, 51:61 and 51:82 and in the B*07:78, 07:84, 13:18, 13:31, 15:04, 15:137, 39:33, 54:10, 54:20, 55:09, 55:21 and 55:37 alleles. Specific PCR fragment of 315 bp in the B*51:48 and C*08:24 alleles.

Primer mix 42: Specific PCR fragment of 100 bp in the B*51:60 allele. Specific PCR fragment of 135 bp in the B*51:49 allele.

Primer mix 43: Specific PCR fragment of 115 bp in the B*51:58 allele. Specific PCR fragment of 215 bp in the B*51:50 allele.

Primer mix 44: Specific PCR fragment of 280 bp in the B*51:76 and B*08:39 alleles. Specific PCR fragment of 385 bp in the B*51:51 allele.

Primer mix 48: Specific PCR fragment of 95 bp in the B*51:37, 51:90 and 51:92 and in the B*07:84, 13:04, 13:35, 15:16, 15:67, 15:95, 15:155, 35:37, 40:44, 44:20, 44:47, 45:09, 49:04-49:05, 52:12, 54:14-54:16, 55:23 and 55:27 alleles. Specific PCR fragment of 220 bp in the B*51:61 and in the B*13:31, 15:137 and 55:21 alleles. Specific PCR fragment of 95 and 220 bp in the B*15:04 allele.

Primer mix 51: Specific PCR fragment of 85 bp in the B*51:68 allele. Specific PCR fragment of 215 bp in the B*51:72 allele.

Primer mix 53: Specific PCR fragment of 165 bp in the B*51:71 allele. Specific PCR fragment of 260 bp in the B*51:70 allele.

Primer mix 55: Specific PCR fragment of 75 bp in the B*51:77 allele. Specific PCR fragment of 200 bp in the B*51:75 allele.

Primer mix 57: Specific PCR fragment of 145 bp in the B*51:79 allele. Specific PCR fragment of 210 bp in the B*51:78 and in the B*44:02:10 and 44:34 alleles.

Primer mix 59: Specific PCR fragment of 120 bp in the B*51:83 allele. Specific PCR fragment of 240 bp in the B*51:88 allele.

Primer mix 60: Specific PCR fragment of 85 bp in the B*51:94 allele. Specific PCR fragment of 190 bp in the B*51:84 allele.

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Primer mix 61: Specific PCR fragment of 100 bp in the B*51:85 and in the B*27:14, 44:20 and 44:47 alleles. Specific PCR fragment of 210 bp in the B*51:87 allele.

Primer mix 62: Specific PCR fragment of 175 bp in the B*51:86 allele. Specific PCR fragment of 250 bp in the B*51:95 and in the B*39:57 alleles.

Primer mix 63: Specific PCR fragment of 70 bp in the B*51:91 allele. Specific PCR fragment of 175 bp in the B*51:89 allele.

Primer mix 64: Specific PCR fragment of 115 bp in the B*51:67 allele. Specific PCR fragment of 170 bp in the B*51:66 allele.

⁴The B*51:51 and 51:76 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 44.

⁵The B*51:66 and 51:67 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 64.

⁶The B*51:68 and 51:72 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 51.

⁷The B*51:70 and 51:71 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 53.

⁸The B*51:75 and 51:77 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 55.

⁹The B*51:83 and 51:88 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 59.

¹⁰The B*51:84 and 51:94 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 60.

¹¹The B*51:86 and 51:95 alleles may be distinguished by the different sizes of the specific PCR products generated by primer mix 62.

‘w’, might be weakly amplified.

Lot No.: 15K

Lot-specific Information

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Primers

Well No.	1	2	3	4	5	6	7	8	9	10	11	12
5'-primer(s) ¹	206 5'-gAC 3'	527 5'-TgA 3'	357 5'-Tgg 3'	357 5'-Tgg 3'	355 5'-TCA 3'	357 5'-Tgg 3'	355 5'-CCC 3'	206 5'-gAC 3'	408 5'-ggT 3'	357 5'-Tgg 3'	357 5'-Tgg 3'	3 rd 5'-CTT 3'
									431 5'-CgA 3'			
									540 5'-gAC 3'			
3'-primer(s) ²	272 5'-TgA 3'	583 5'-gTg 3'	583 5'-gTA 3'	571 5'-CCC 3'	583 5'-gTg 3'	527 5'-CCA 3'	583 5'-gTg 3'	272 5'-Tgg 3'	583 5'-gTg 3'	477 5'-gCg 3'	559 5'-CTC 3'	621 5'-ggg 3'
						527 5'-CCA 3'				559 5'-CgT 3'		
Well No.	1	2	3	4	5	6	7	8	9	10	11	12

Well No.	13	14	15	16	17	18	19	20	21	22	23	24
5'-primer(s) ¹	165 5'-ACC 3'	357 5'-Tgg 3'	357 5'-Tgg 3'	404 5'-CCC 3'	206 5'-gAC 3'	141 5'-ATT 3'	357 5'-Tgg 3'	141 5'-ATT 3'	357 5'-Tgg 3'	141 5'-ATT 3'	141 5'-ATT 3'	141 5'-ATT 3'
				420 5'-TTA 3'		357 5'-Tgg 3'						
				431 5'-CgA 3'								
3'-primer(s) ²	322 5'-gTC 3'	419 5'-CgA 3'	414 5'-TgT 3'	559 5'-CAg 3'	272 5'-TgC 3'	242 5'-CCC 3'	463 5'-gCg 3'	211 5'-ggT 3'	445 5'-ggA 3'	259 5'-gTT 3'	311 5'-ggT 3'	309 5'-ATC 3'
			544 5'-ggT 3'			538 5'-gTC 3'			502 5'-CTA 3'			
			544 5'-ggT 3'									
Well No.	13	14	15	16	17	18	19	20	21	22	23	24

Well No.	25	26	27	28	29	30	31	32	33	34	35	36
5'-primer(s) ¹	357 5'-Tgg 3'	357 5'-Tgg 3'	49 5'-CAg 3'	49 5'-CAg 3'	357 5'-Tgg 3'	369 5'-TAC 3'	357 5'-Tgg 3'	435 5'-AAA 3'	141 5'-ATT 3'	355 5'-TCA 3'	355 5'-TCA 3'	133 5'-CCg 3'
	652 5'-CCg 3'	756 5'-ACT 3'	355 5'-TCA 3'	357 5'-Tgg 3'		369 5'-TAC 3'						
3'-primer(s) ²	445 5'-ggA 3'	419 5'-Cgg 3'	83 5'-TgA 3'	83 5'-TgA 3'	559 5'-CAg 3'	435 5'-TCT 3'	419 5'-Cgg 3'	559 5'-CTC 3'	295 5'-TCA 3'	572 5'-gCg 3'	538 5'-gTC 3'	309 5'-ATC 3'
	523 5'-ACA 3'	419 5'-CgA 3'	226 5'-CAC 3'	572 5'-gCg 3'			419 5'-CgA 3'					
	787 5'-TCC 3'	872 5'-TCA 3'	583 5'-gTg 3'				539 5'-TCC 3'					
Well No.	25	26	27	28	29	30	31	32	33	34	35	36

Lot No.: **15K**

Lot-specific Information

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Well No.	37	38	39	40	41	42	43	44	45	46	47	48
5'-primer(s) ¹	141	419	362	165	357	106	141	106	141	103	209	357
	5'-ATT 3'	5'-gTC 3'	5'-gAC 3'	5'-ACC 3'	5'-Tgg 3'	5'-CCA 3'	5'-ATT 3'	5'-CCA 3'	5'-ATT 3'	5'-CCT 3'	5'-ggA 3'	5'-Tgg 3'
	357		363		736	488		667				
	5'-Tgg 3'		5'-AgC 3'		5'-gCA 3'	5'-Cgg 3'		5'-AgA 3'				
			383									
			5'-ggA 3'									
3'-primer(s) ²	265	583	583	309	539	163	214	343	292	141	292	412
	5'-CTA 3'	5'-gTg 3'	5'-gTg 3'	5'-ATC 3'	5'-TCC 3'	5'-ggC 3'	5'-CCA 3'	5'-T 3'	5'-gTg 3'	5'-gCA 3'	5'-gTC 3'	5'-gTC 3'
	539				916	583	314	916			292	412
	5'-TCT 3'				5'-gAT 3'	5'-gTg 3'	5'-gCC 3'	5'-gAT 3'			5'-gTC 3'	5'-gTC 3'
												538
												5'-CCA 3'
Well No.	37	38	39	40	41	42	43	44	45	46	47	48

Well No.	49	50	51	52	53	54	55	56	57	58	59	60
5'-primer(s) ¹	142	363	97	475	357	193	141	317	141	457	141	357
	5'-TCg 3'	5'-AgC 3'	5'-TCg 3'	5'-CCA 3'	5'-Tgg 3'	5'-CCA 3'	5'-ATT 3'	5'-gCT 3'	5'-ATT 3'	5'-AgC 3'	5'-ATT 3'	5'-Tgg 3'
			357				357				357	
			5'-Tgg 3'				5'-Tgg 3'				5'-Tgg 3'	
3'-primer(s) ²	259	477	141	583	481	272	177	412	246	583	218	403
	5'-gTT 3'	5'-gCg 3'	5'-gCA 3'	5'-gTg 3'	5'-gTg 3'	5'-TgA 3'	5'-AAA 3'	5'-gTT 3'	5'-TAA 3'	5'-gTg 3'	5'-gCC 3'	5'-gCA 3'
	259		530		578		514		309		555	505
	5'-gTT 3'		5'-CCT 3'		5'-TgA 3'		5'-CTg 3'		5'-gTg 3'		5'-CCg 3'	5'-gCC 3'
Well No.	49	50	51	52	53	54	55	56	57	58	59	60

Well No.	61	62	63	64
5'-primer(s) ¹	357	357	138	145
	5'-Tgg 3'	5'-Tgg 3'	5'-TTg 3'	5'-CAA 3'
			529	200
			5'-AgA 3'	5'-TCg 3'
3'-primer(s) ²	418	493	272	272
	5'-gTC 3'	5'-CCT 3'	5'-TgA 3'	5'-TgA 3'
	528	565	559	
	5'-gCA 3'	5'-CAT 3'	5'-CAg 3'	
Well No.	61	62	63	64

¹The nucleotide position, in the 2nd, 3rd or 4th exon or 3rd intron, matching the specificity-determining 3'-end of the primer is given. Nucleotide numbering as on the www.ebi.ac.uk/imgt/hla web site. The sequence of the 3 terminal nucleotides of the primer is given.

²The nucleotide position, in the 2nd, 3rd, 4th or 5th exon, matching the specificity-determining 3'-end of the primer is given in the anti-sense direction. Nucleotide numbering as on the www.ebi.ac.uk/imgt/hla web site. The sequence of the 3 terminal nucleotides of the primer is given.

CELL LINE VALIDATION SHEET																			
HLA-B*51 SSP subtyping kit																			
			Prod. No.:	Well															
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
				201073101	201073102	201073103	201073104	201073105	201073106	201073107	201073108	201073109	201073110	201073111	201073112	201073113	201073114	201073115	201073116
	IHWC cell line	B*																	
1	9001 SA	*07:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	9280 LK707	*52:01	*73:01	-	+	-	-	-	+	-	+	-	+	+	-	-	+	-	-
3	9011 E4181324	*52:01		-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
4	9275 GU373	*15:10	*53:01	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	9009 KAS011	*37:01		-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
6	9353 SM	*39:01	*51:01	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	9020 QBL	*18:01		-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-
8	9025 DEU	*35:01		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	9026 YAR	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	9107 LKT3	*54:01		-	-	+	-	-	+	-	-	-	+	-	-	-	-	-	-
11	9051 PITOUT	*44:03		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	9052 DBB	*57:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	9004 JESTHOM	*27:05		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	9071 OLGA	*15:01	*15:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	9075 DKB	*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	9037 SWEIG007	*40:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	9282 CTM3953540	*08:01	*55:01	-	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-
18	9257 32367	*14:01	*56:01	-	+	+	-	-	+	+	-	-	-	-	-	-	-	-	+
19	9038 BM16	*18:01		-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-
20	9059 SLE005	*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	9064 AMALA	*15:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	9056 KOSE	*35:03		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	9124 IHL	*40:02	*56:02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
24	9035 JBUSH	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	9049 IBW9	*14:02		-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-
26	9285 WT49	*58:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	9191 CH1007	*07:05	*51:01	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	9320 BEL5GB	*44:02	*44:03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	9050 MOU	*44:03		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	9021 RSH	*42:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	9019 DUCAF	*18:01		-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-
32	9297 HAG	*41:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	9098 MT14B	*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	9104 DHIF	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	9302 SSTO	*44:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	9024 KT17	*15:01	*35:01	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	9065 HHKB	*07:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	9099 LZL	*15:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	9315 CML	*08:01	*27:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	9134 WHONP199	*13:02	*46:01	-	-	+	-	-	+	-	-	-	-	+	-	-	-	-	-
41	9055 H0301	*14:02		-	+	-	-	-	-	+	-	-	-	-	-	-	-	-	-
42	9066 TAB089	*46:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	9076 T7526	*46:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	9057 TEM	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	9239 SHJO	*42:01	*50:01	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+
46	9013 SCHU	*07:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	9045 TUBO	*51:01		+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	9303 TER-ND	*35:01	*44:03	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CELL LINE VALIDATION SHEET																				
HLA-B*51 SSP subtyping kit																				
			Prod. No.:	Well																
				17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	
	IHWC cell line	B*		201073117	201073118	201073119	201073120	201073121	201073122	201073123	201073124	201073125	201073126	201073127	201073128	201073129	201073130	201073131	201073132	
1	9001 SA	*07:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	9280 LK707	*52:01	*73:01	-	-	+	-	-	-	-	-	-	+	-	-	+	-	+	-	-
3	9011 E4181324	*52:01		-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
4	9275 GU373	*15:10	*53:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	9009 KAS011	*37:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	9353 SM	*39:01	*51:01	-	-	-	-	-	+	-	+	-	-	-	-	+	-	-	-	-
7	9020 QBL	*18:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	9025 DEU	*35:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	9026 YAR	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	9107 LKT3	*54:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	9051 PITOUT	*44:03		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	9052 DBB	*57:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	9004 JESTHOM	*27:05		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	9071 OLGA	*15:01	*15:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	9075 DKB	*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	9037 SWEIG007	*40:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	9282 CTM3953540	*08:01	*55:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	9257 32367	*14:01	*56:01	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
19	9038 BM16	*18:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	9059 SLE005	*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	9064 AMALA	*15:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	9056 KOSE	*35:03		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	9124 IHL	*40:02	*56:02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	9035 JBUSH	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	9049 IBW9	*14:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	9285 WT49	*58:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	9191 CH1007	*07:05	*51:01	-	-	-	-	-	+	-	+	-	-	-	-	+	-	-	-	-
28	9320 BEL5GB	*44:02	*44:03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	9050 MOU	*44:03		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	9021 RSH	*42:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	9019 DUCAF	*18:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	9297 HAG	*41:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	9098 MT14B	*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	9104 DHIF	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	9302 SSTO	*44:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	9024 KT17	*15:01	*35:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	9065 HHKB	*07:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	9099 LZL	*15:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	9315 CML	*08:01	*27:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	9134 WHONP199	*13:02	*46:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	9055 H0301	*14:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	9066 TAB089	*46:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	9076 T7526	*46:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	9057 TEM	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	9239 SHJO	*42:01	*50:01	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
46	9013 SCHU	*07:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	9045 TUBO	*51:01		-	-	-	-	-	+	-	+	-	-	-	-	+	-	-	-	-
48	9303 TER-ND	*35:01	*44:03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CELL LINE VALIDATION SHEET																					
HLA-B*51 SSP subtyping kit																					
				Prod. No.:	Well																
					33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	
					201073133	201073134	201073135	201073136	201073137	201073138	201073139	201073140	201073141	201073142	201073143	201073144	201073145	201073146	201073147	201073148	
	IHWC cell line		B*																		
1	9001 SA		*07:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	9280 LK707		*52:01	*73:01	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
3	9011 E4181324		*52:01		-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
4	9275 GU373		*15:10	*53:01	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
5	9009 KAS011		*37:01		-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	9353 SM		*39:01	*51:01	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
7	9020 QBL		*18:01		-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
8	9025 DEU		*35:01		-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
9	9026 YAR		*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	9107 LKT3		*54:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	9051 PITOUT		*44:03		-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	9052 DBB		*57:01		-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
13	9004 JESTHOM		*27:05		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	9071 OLGA		*15:01	*15:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	9075 DKB		*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	9037 SWEIG007		*40:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	9282 CTM3953540		*08:01	*55:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	9257 32367		*14:01	*56:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	9038 BM16		*18:01		-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
20	9059 SLE005		*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	9064 AMALA		*15:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	9056 KOSE		*35:03		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	9124 IHL		*40:02	*56:02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	9035 JBUSH		*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	9049 IBW9		*14:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	9285 WT49		*58:01		-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
27	9191 CH1007		*07:05	*51:01	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
28	9320 BEL5GB		*44:02	*44:03	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	9050 MOU		*44:03		-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	9021 RSH		*42:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	9019 DUCAF		*18:01		-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
32	9297 HAG		*41:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	9098 MT14B		*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	9104 DHIF		*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	9302 SSTO		*44:02		-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	9024 KT17		*15:01	*35:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	9065 HHKB		*07:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	9099 LZL		*15:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	9315 CML		*08:01	*27:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	9134 WHONP199		*13:02	*46:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	9055 H0301		*14:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	9066 TAB089		*46:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	9076 T7526		*46:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	9057 TEM		*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	9239 SHJO		*42:01	*50:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	9013 SCHU		*07:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	9045 TUBO		*51:01		-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-
48	9303 TER-ND		*35:01	*44:03	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

CELL LINE VALIDATION SHEET																			
HLA-B*51 SSP subtyping kit																			
				Well															
				49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
			Prod. No.:	201073149	201073150	201073151	201073152	201073153	201073154	201073155	201073156	201073157	201073158	201073159	201073160	201073161	201073162	201073163	201073164
	IHCW cell line	B*																	
1	9001 SA	*07:02		-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	9280 LK707	*52:01	*73:01	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
3	9011 E4181324	*52:01		-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
4	9275 GU373	*15:10	*53:01	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	9009 KAS011	*37:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	9353 SM	*39:01	*51:01	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
7	9020 QBL	*18:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	9025 DEU	*35:01		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	9026 YAR	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	9107 LKT3	*54:01		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	9051 PITOUT	*44:03		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	9052 DBB	*57:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	9004 JESTHOM	*27:05		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	9071 OLGA	*15:01	*15:20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15	9075 DKB	*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	9037 SWEIG007	*40:02		-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
17	9282 CTM3953540	*08:01	*55:01	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	9257 32367	*14:01	*56:01	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	9038 BM16	*18:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	9059 SLE005	*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	9064 AMALA	*15:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	9056 KOSE	*35:03		+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	9124 IHL	*40:02	*56:02	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	9035 JBUSH	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	9049 IBW9	*14:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	9285 WT49	*58:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	9191 CH1007	*07:05	*51:01	-	+	-	-	-	-	-	+	-	-	-	-	-	-	-	-
28	9320 BEL5GB	*44:02	*44:03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	9050 MOU	*44:03		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	9021 RSH	*42:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31	9019 DUCAF	*18:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
32	9297 HAG	*41:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
33	9098 MT14B	*40:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
34	9104 DHIF	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	9302 SSTO	*44:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	9024 KT17	*15:01	*35:01	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	9065 HHKB	*07:02		-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
38	9099 LZL	*15:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
39	9315 CML	*08:01	*27:05	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
40	9134 WHONP199	*13:02	*46:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
41	9055 H0301	*14:02		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
42	9066 TAB089	*46:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	9076 T7526	*46:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
44	9057 TEM	*38:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
45	9239 SHJO	*42:01	*50:01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
46	9013 SCHU	*07:02		-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
47	9045 TUBO	*51:01		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
48	9303 TER-ND	*35:01	*44:03	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-

CERTIFICATE OF ANALYSIS**Olerup SSP® HLA-B*51 SSP**

Product number: 101.561-24u/03u – without Taq pol.
Lot number: 15K
Expiry date: 2012-June-01
Number of tests: 24 tests – Product No. 101.561-24u
 3 tests – Product No. 101.561-03u
Number of wells per test: 64

Well specifications:

Well No.	Production No.	Well No.	Production No.	Well No.	Production No.
1	2010-731-01	25	2010-731-25	49	2010-731-49
2	2010-731-02	26	2010-731-26	50	2010-731-50
3	2010-731-03	27	2010-731-27	51	2010-731-51
4	2010-731-04	28	2010-731-28	52	2010-731-52
5	2010-731-05	29	2010-731-29	53	2010-731-53
6	2010-731-06	30	2010-731-30	54	2010-731-54
7	2010-731-07	31	2010-731-31	55	2010-731-55
8	2010-731-08	32	2010-731-32	56	2010-731-56
9	2010-731-09	33	2010-731-33	57	2010-731-57
10	2010-731-10	34	2010-731-34	58	2010-731-58
11	2010-731-11	35	2010-731-35	59	2010-731-59
12	2010-731-12	36	2010-731-36	60	2010-731-60
13	2010-731-13	37	2010-731-37	61	2010-731-61
14	2010-731-14	38	2010-731-38	62	2010-731-62
15	2010-731-15	39	2010-731-39	63	2010-731-63
16	2010-731-16	40	2010-731-40	64	2010-731-64
17	2010-731-17	41	2010-731-41		
18	2010-731-18	42	2010-731-42		
19	2010-731-19	43	2010-731-43		
20	2010-731-20	44	2010-731-44		
21	2010-731-21	45	2010-731-45		
22	2010-731-22	46	2010-731-46		
23	2010-731-23	47	2010-731-47		
24	2010-731-24	48	2010-731-48		

The specificity of each primer solution of the kit has been tested against 48 well characterized IHWC cell line DNAs.

No DNAs carrying the alleles to be amplified by primer solutions 5, 13, 17, 20, 21, 25, 27, 32, 33, 36, 37, 39, 42 to 46, 51 to 53, 55 and 57 to 64 were available. The specificities of the primers in primer solutions 5, 17, 27, 32, 37, 39, 42, 44, 46, 51, 57 and 61 were tested by separately adding one additional 5'-primer, respectively one additional 3'-primer. In primer solutions 13, 20, 21, 33, 43, 45, 53, 55, 59, 60 and 62 it was only possible to test the 5'-primer, the 3'-primer was not possible to test. In primer solutions 36, 52, 58, 63 and 64 it

Lot No.: **15K**

Lot-specific Information

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was only possible to test the 3'-primer, the 5'-primer was not possible to test. In primer solutions 9, 16, 25, 39, 42 and 44 one or two of the 5'-primers were not possible to test. In primer solution 15, 18, 26 to 28, 37, 42, 51, 57 and 61 one or two of the 3'-primers were not possible to test. Additional primers in primer solutions 18, 26, 28, 31, 41, 47 and 48 were tested by separately adding one 5'-primer or one 3'-primer.

Results: No false positive or false negative amplifications were obtained.

Date of approval: 2010-June-29

Approved by:

Quality Control, Supervisor

Lot No.: **15K**

Lot-specific Information

www.olerup-ssp.com

Declaration of Conformity

Product name: *Olerup* SSP® HLA-B*51
Product number: 101.561-24u/03u
Lot number: 15K

Intended use: HLA-B*51 histocompatibility testing

Manufacturer: *Olerup* SSP AB
Hasselstigen 1
SE-133 33 Saltsjöbaden, Sweden
Phone: +46-8-717 88 27
Fax: +46-8-717 88 18

We, *Olerup* SSP AB, hereby declare that this product, to which this Declaration of Conformity relates is in conformity with the following Standard(s) and other normative document(s) ISO 9001:2008 and ISO 13485:2003, following the provisions of the 98/79/EC Directive on *in vitro* diagnostic medical devices, Annex II List B, conformity assessed using Annex IV, as transposed into the national laws of the Member States of the European Union.

The Technical Documentation File is maintained at *Olerup* SSP AB, Hasselstigen 1, SE-133 33 Saltsjöbaden, Sweden.

The Authorized Representative located within the Community is: *Olerup* SSP AB.

Notified Body: Lloyd's Register Quality Assurance Limited, Hiramford, Middlemarch Office Village, Siskin Drive, Coventry CV3 4FJ, United Kingdom. (Notified Body number: 0088.)

Saltsjöbaden, Sweden
2010-June-29

Olle Olerup
Managing Director

Lot No.: **15K**

Lot-specific Information

www.olerup-ssp.com**ADDRESSES:****Manufacturer:****Olerup SSP AB**, Hasselstigen 1, SE-133 33 Saltsjöbaden, Sweden.**Tel:** +46-8-717 88 27**Fax:** +46-8-717 88 18**E-mail:** info-ssp@olerup.com**Web page:** <http://www.olerup-ssp.com>**Distributed by:****Olerup GmbH**, Löwengasse 47 / 6, AT-1030 Vienna, Austria.**Tel:** +43-1-710 15 00**Fax:** +43-1-710 15 00 10**E-mail:** support-at@olerup.com**Web page:** <http://www.olerup.com>**Olerup Inc.**, 901 S. Bolmar St., Suite R, West Chester, PA 19382**Tel:** 1-877-OLERUP1**Fax:** 610-344-7989**E-mail:** info.us@olerup.com**Web page:** <http://www.olerup.com>For information on *Olerup* SSP distributors worldwide, contact **Olerup GmbH**.