CUT-PROOF
Restriction Enzymes

Enzyme	Recognition site	Cat. No.	Unit	Price
Aat II	G A C G T C C T G C A G	EBR-1001	250 unit	80,000
Acc III	T C C G G A A G G C C T	EBR-1005	250 unit	80,000
Alu I	A G C T T C G A	EBR-1011	500 unit	80,000
ApaL I	G T G C A C C A C G T G	EBR-1015	1,000 unit	70,000
Ase I	A T T A A T T A A T T A	EBR-1017	2,500 unit	80,000
Ava II	A G G T C C C C T G G A	EBR-1021	1,000 unit	80,000
BamH I	G G A T C C C C T A G G	EBR-1025	10,000 unit	50,000
Bbv I	G C A G C $(N)_8$ C G T C G $(N)_{12}$	EBR-1031	200 unit	70,000
Bgl I	GCCN NNN NGGC CGGN NNN NCCG	EBR-1035	1,000 unit	60,000
Dde I	C T N A G G A N T C	EBR-1043	250 unit	70,000
Dpn II	G A T C C T A G	EBR-1047	1,000 unit	70,000
Dra III	CAC NNN GTG GTG NNN CAC	EBR-1051	2,500 unit	70,000
EcoR I	G A A T T C C T T A A G	EBR-1055	10,000 unit	50,000
Fok I	GGATG $(N)_9$ CCTAC $(N)_{13}$	EBR-1059	1,000 unit	80,000
Hae III	G G C C C C G G	EBR-1065	2,500 unit	70,000
Hinc II	G T Py Pu A C C A Pu Py T G	EBR-1071	1,000 unit	70,000
Hinf I	G A N T C C T N A G	EBR-1075	2,500 unit	70,000
Hpa II	C C G G G G C C	EBR-1079	1,000 unit	70,000
Kpn I	G G T A C C C C A T G G	EBR-1083	5,000 unit	70,000
Mbo II	GAAGA $(N)_8$ CTTCT $(N)_7$	EBR-1087	250 unit	80,000
Mwo I	G C NNNNN NN GC C G NN NNNNN CG	EBR-1091	250 unit	80,000
Nco I	C C A T G G G G T A C C	EBR-1097	1,000 unit	60,000
Acc I	A T G T C G A C C A T A T G G C	EBR-1003	250 unit	80,000
Afl II	C T T A A G G A A T T C	EBR-1201	2,500 unit	80,000
Apa I	G G G C C C C C C G G G	EBR-1013	2,500 unit	60,000
Apo I	Pu A A T T Py Py T T A A Pu	EBR-1203	500 unit	80,000
Ava I	C Py C G Pu G G Pu G C Py C	EBR-1019	2,500 unit	80,000
Ava III	A T G C A T T A C G T A	EBR-1023	1,000 unit	80,000
Ban I	G G Py Pu C C C C Pu Py G G	EBR-1027	2,500 unit	70,000
Bcl I	T G A T C A A C T A G T	EBR-1033	1,000 unit	60,000
Bgl II	A G A T C T T C T A G A	EBR-1037	2,500 unit	60,000
Dpn I	CH_3 G A T C C T A G CH_3	EBR-1045	500 unit	70,000
Dra I	T T T A A A A A A T T T	EBR-1049	1,000 unit	70,000
Eag I	C G G C C G G C C G G C	EBR-1053	500 unit	70,000
EcoR V	G A T A T C C T A T A G	EBR-1057	5,000 unit	70,000
Hae II	Pu G C G C Py Py C G C G Pu	EBR-1063	1,000 unit	70,000
Hae IV	$(N)_7$ GAPyNNNNNPuTC $(N)_{14}$ $(N)_{13}$CTPuNNNNNPyAG $(N)_9$	EBR-1067	500 unit	80,000
Hind III	A A G C T T T T C G A A	EBR-1073	10,000 unit	60,000
Hpa I	G T T A A C C A A T T G	EBR-1077	500 unit	70,000
Kas I	G G C G C C C C G C G G	EBR-1205	500 unit	70,000
Mbo I	G A T C C T A G	EBR-1085	500 unit	80,000
Mlu I	A C G C G T T G C G C A	EBR-1089	1,000 unit	80,000
Nae I	G C C G G C C G G C C G	EBR-1093	500 unit	80,000
Nde I	C A T A T G G T A T A C	EBR-1099	5,000 unit	70,000

Enzyme	Recognition site	Cat. No.	Unit	Price
Nhe I	G|CTAGC CGATC|G	EBR-1101	1,000 unit	70,000
Pho I	GG|CC CC|GG	EBR-1107	500 unit	80,000
Pvu II	CAG|CTG GTC|GAC	EBR-1113	2,500 unit	70,000
Sac II	CCGC|GG GG|CGCC	EBR-1117	1,000 unit	70,000
Sca I	AGT|ACT TCA|TGA	EBR-1123	1,000 unit	70,000
Sma I	CCC|GGG GGG|CCC	EBR-1127	2,500 unit	70,000
Sph I	GCATG|C C|GTACG	EBR-1133	500 unit	80,000
TthHB8 I	T|CGA AGC|T	EBR-1145	2,500 unit	70,000
Xho I	C|TCGAG GAGCT|C	EBR-1149	5,000 unit	60,000
Not I	GC|GGCCGC CGCCGG|CG	EBR-1103	500 unit	70,000
Pst I	CTGCA|G G|ACGTC	EBR-1109	10,000 unit	60,000
Sac I	GAGCT|C C|TCGAG	EBR-1115	2,500 unit	70,000
Sal I	G|TCGAC CAGCT|G	EBR-1119	2,500 unit	70,000
Sfi I	GGCC NNNN|N GGCC CCGG N|NNNN CCGG	EBR-1125	2,500 unit	80,000
Spe I	A|CTAGT TGATC|A	EBR-1131	500 unit	70,000
Ssp I	AAT|ATT TTA|TAA	EBR-1135	500 unit	70,000
Xba I	T|CTAGA AGATC|T	EBR-1147	5,000 unit	70,000
Xma I	C|CCGGG GGGCC|C	EBR-1153	250 unit	70,000

Pu = A or G Py = C or T N = A or C or G or T

Buffer Composition (1x)

Buffer 1 : 10 mM Bis Tris Propane-HCl, pH7.0, 10 mM $MgCl_2$, 1 mM DTT

Buffer 2 : 10 mM Tris-HCl, pH7.9, 50 mM NaCl, 10 mM $MgCl_2$, 1 mM DTT

Buffer 3 : 50 mM Tris-HCl, pH7.9, 100 mM NaCl, 10 mM $MgCl_2$, 1 mM DTT

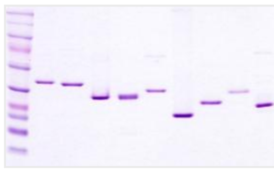
Buffer 4 : 20 mM Tris-acetate, pH7.9, 10 mM magnesium acetate, 50 mM potassium acetate, 1 mM DTT

Buffer BamH I : 10 mM Tris-HCl, pH7.9, 150 mM NaCl, 10 mM $MgCl_2$, 1 mM DTT

Buffer EcoR I : 100 mM Tris-HCl, pH7.5, 50 mM NaCl, 10 mM $MgCl_2$, 0.025% Triton X-100

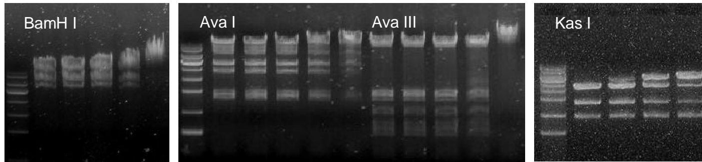
Quality Control

Purity by SDS-PAGE: Purified restriction endonucleases are analysized on a SDS-PAGE.



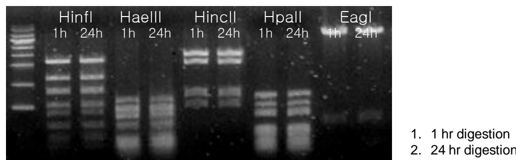
Analyzed purified enzymes on a 7.5% Gradi-Gel II

Unit Determination: One unit of restriction endonuclease activity is defined as the amount of enzyme required to completely digest 1 µg of substrate DNA (lambda DNA or plasmid DNA) in a total reaction volume of 10 µl in one hour using the buffer provided. Incubations are performed in capped microcentrifuge tubes at the appropriate incubation temperature. Concentrated enzymes are diluted to approximately 1,000 units/ml using the recommended storage buffers before determining their activity.



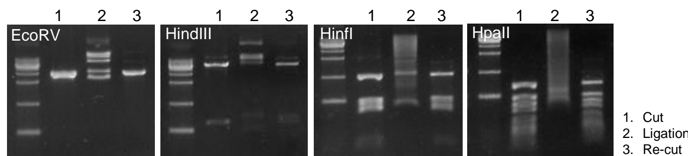
Assay for Non-specific Endonucleases: To assay for non-specific endonuclease contamination, each restriction endonuclease is incubated with a supercoiled plasmid substrate lacking the recognition sequence of the restriction endonuclease. A single non-specific nick in the RF I DNA converts it to the RF II form (nicked circle). Aliquots are incubated with 1 µg of RF I (supercoiled form) DNA in a reaction volume of 10 µl using the recommended reaction buffer. Incubations are performed for 4 hours at the recommended temperature. The two forms are easily distinguished on agarose gels and the percent conversion from RF I to RF II is determined.

Assay for Nuclease Contamination: All restriction endonucleases are incubated overnight in their recommended reaction buffer with 1 µg of substrate DNA in a volume of 10 µl. The characteristic banding pattern produced by the enzyme for one hour is compared to the pattern produced from an excess of enzyme incubated overnight. A sharp, unaltered pattern under these conditions is an indication that the enzyme preparation is free of detectable levels of non-specific DNases. The maximum number of units that can be incubated overnight is reported.



1. 1 hr digestion
2. 24 hr digestion

Ligation of DNA Fragments: DNA fragments are produced by an excessive over-digestion of substrate DNA with each restriction endonuclease. These fragments are then ligated with T4 DNA Ligase at a 5´ termini concentration of 0.1–1.0 µM. The ligated fragments are then recut with the same restriction endonuclease. Ligation can only occur if the 3´ and 5´ termini are left intact, and only those molecules with a perfectly restored recognition site can be recleaved. A normal banding pattern after cleavage indicates that both the 3´ and 5´ termini are intact and the enzyme preparation is free of detectable exonucleases and phosphatases.



1. Cut
2. Ligation
3. Re-cut

Blue/White Screening Assay: Enzymes used for cloning applications are tested by an additional quality control, the Blue/White Screening Assay, to determine the integrity of the DNA ends produced after digestion with an excess of enzyme. The assay is performed by digesting an appropriate vector at a unique site within the lacZα gene with a 10-fold excess of enzyme, ligating, transforming and plating on X-Gal/IPTG/Amp plates. Successful cleavage, ligation and expression of β-galactosidase is a function of how intact its gene remains after cloning. An intact gene gives rise to a blue colony. While an interrupted gene (i.e., degraded DNA end) gives rise to a white colony. All restriction enzymes tested must produce fewer than 1% white colonies in order to be Blue/White certified.