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For life science research only. Not for use in diagnostic procedures.

SuRE/Cut Buffers for Restriction Enzymes

SuRE/Cut Buffer A
Cat. No. 11 417 959 001 5 × 1 ml

SuRE/Cut Buffer B
Cat. No. 11 417 967 001 5 × 1 ml

SuRE/Cut Buffer L
Cat. No. 11 417 975 001 5 × 1 ml

SuRE/Cut Buffer M
Cat. No. 11 417 983 001 5 × 1 ml

SuRE/Cut Buffer H
Cat. No. 11 417 991 001 5 × 1 ml

SuRE/Cut Buffer Set for Restriction Enzymes
Cat. No. 11 082 035 001 1 ml of A, B, L, M, H

Version 22
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Store at −15 to −25° C

The SuRE/Cut Buffer System consists of five optimized incubation buffers, 10x concentrated, for DNA restriction digest. Activity of all restriction enzymes has been determined in each buffer to select 100 % activity or to calculate activity in double-digests.

Table 1: Buffer Composition

Buffer components	Final concentration in mM (1:10 diluted set buffer)				
	A	**B**	**L**	**M**	**H**
Tris acetate	33	–	–	–	–
Tris-HCl	–	10	10	10	50
Mg-acetate	10	–	–	–	–
$MgCl_2$	–	5	10	10	10
K-acetate	66	–	–	–	–
NaCl	–	100	–	50	100
Dithioerythritol (DTE)	–	–	1	1	1
Dithiothreitol (DTT)	0.5	–	–	–	–
2-Mercaptoethanol	–	1	–	–	–
pH at 37° C	7.9	8.0	7.5	7.5	7.5

Table 1 compiles the Roche Diagnostics incubation buffer system for restriction enzymes and its composition. Buffer composition is described in (1) and (2) with slight modifications.

Table 2: Quick Reference for Special Incubation Temperature

Acs I	(50° C)	*Bsm* I	(65° C)	*Mae* III	(55° C)
Acy I	(50° C)	*Bsp* LU 11	(48° C)	*Sfi* I	(50° C)
Apa I	(30° C)	*Bss* HII	(50° C)	*Sma* I	(25° C)
Bcl I	(50° C)	*Bst* EII	(60° C)	*Swa* I	(25° C)
Bse AI	(55° C)	*Bst* XI	(45° C)	*Taq* I	(65° C)
Bsi WI	(55° C)	*Mae* I	(45° C)	*Tru* 9I	(65° C)
Bsi YI	(55° C)	*Mae* II	(50° C)		

Table 2: All enzymes should be incubated at 37°C unless otherwise stated in brackets after the enzyme name.

Table 3: Quick Buffer Reference

A	*Aat* II *Acc* I Alu I *Alw 44* I ***Apa* I** *Ava* II	*Bmy* I *Bss* HII *Cell* II *Dpn* I *Eae* I *Hae* II	*Hpa* I *Ksp* 632I *Mlu NI* *Mro* I *Nae* I *Nar* I	***Sac* I** *Sau* 3A *Sau* 96I *Sgr* AI ***Sma* I**
B	*Acs* I *Acy* I *Asp I* *Asp 700* ***Asp* 718** *Ava* I	***Bam* HI** *Ban* II *Bbr* PI *Bpu* AI *Bse* AI *Bst* EII	*Ecl XI* ***Eco* RV** ***Hind* III** *Mvn I* *Nru I* *Pin* AI	*Rca I* *Scr* FI *Sex* AI *Ssp* BI ***Stu* I** *Taq I* *Van* 91 I
L	*Asp* EI *Cfo* I *Dra* II ***Hpa* II**	***Kpn* I** Ksp I ***Msp* I**	*Psp* 1406 I ***Rsa* I** *Rsr* II	*Xho* II *XmaCI*
M	***Bcl* I** *Bfr* I ***Bgl* II** *Bsi* YI ***Dra* I**	*Fok* I *Hae III* *Hind II* *Mun* I	***Nhe* I** *Nsp* I *Pvu II* ***Sfi* I** *Sna* BI	***Sph* I** *Tru 9I*
H	*Afl* III *Avi* II ***Bgl* I** *Bln* I *Bsi* WI *Bsm* I *Bsp* LU 11 I *Bst* 1107 I *Bst* XI	***Cla* I** *Dde* I *Dra* III *Dsa* I ***Eco* RI** *Eco* RII *Eco* 47 III ***Hinf* I** *Ita* I *Mam I*	***Mlu* I** *Mva* I ***Nco* I** *Nde* I ***Not* I** *Nsi I* ***Pst* I** *Pvu* I ***Sal* I** ***Sca* I**	*Sfu* I ***Spe* I** ***Ssp* I** *Sty* I *Swa I* ***Xba* I** ***Xho* I**

Table 3: Correct buffer to be used with each restriction enzyme. Enzymes available in high and low concentrations are indicated in bold.
Restriction enzymes Mae I, Mae II, Mae III, and Nde II require special incubation buffers for optimal activity (supplied with the respective enzymes)

Table 4: Percentage Activity

Enzyme	A	B	L	M	H
Aat II	**100**	0–10	0–10	0–10	0-10
Acc I	**100**	0–10	10–25	0–10	0-10
Acs I	50–75	**100**	0–10	75–100	50-75
Acy I	10–25	**100**	10–25	50–75	25-50
Afl III	50–75	75–100	50–75	75–100	**100**
Alu I	**100**	50–75	25–50	25–50	0-10
Alw 44 I	**100**	25–50	75–100	100	10-25
Apa I	**100**	10-25	50-75	50-75	0-10
Asp I	50–75	**100**	25–50	75–100	75–100
Asp 700	50–75	**100**	10–25	50–75	0–10
Asp 718	75–100	**100**	0–10	25–50	50–75
Asp EI	10–25	10–25	**100**	25–50	0–10
Ava I	100	**100**	10–25	50–75	10–25
Ava II	**100**	50–75	75–100	100	10–25
Avi II	50–75	75–100	10–25	50–75	**100**
Bam HI	100	**100**	75–100	100	25–50
Ban I	*100*	0–10	25–50	0–10	0–10
Bbr PI	75–100	**100**	75–100	75–100	25–50
Bcl I	100	100	25–50	**100**	100
Bfr I	25–50	25–50	75–100	**100**	25–50
Bgl I	25–50	50–75	10–25	25–50	**100**
Bgl II	100	100	25–50	**100**	100
Bln I	25-50	50-75	0-10	25-50	**100**
Bmy I	**100**	0–10	100	25–50	0–10
Bpu AI	10–25	**100**	25–50	25–50	50–75
Bse AI	75–100	**100**	0–10	50–75	25–50
Bsi WI	25–50	100	10–25	75–100	**100**
Bsi YI	100	100	50–75	**100**	25–50
Bsm I	0–10	50–75	0–10	25–50	**100**
Bsp LU 11	100	100	25-50	50-75	**100**
Bss HII	**100**	100	75–100	100	75–100
Bst 1107	25–50	50–75	0–10	25–50	**100**
Bst EII	75–100	100	25–50	50–75	50–75
Bst XI	10–25	100	0–10	10–25	**100**
Cel II	**100**	50–75	75-100	75-100	100
Cfo I	75–100	50–75	**100**	50–75	25–50
Cla I	100	100	75–100	100	**100**
Dde I	50–75	75–100	25–50	25–50	**100**
Dpn I	**100**	75–100	50–75	75–100	75–100
Dra I	100	75–100	100	**100**	50–75
Dra II	100	50–75	**100**	50–75	0–10
Dra III	50–75	75–100	50–75	75–100	**100**
Eae I	**100**	25–50	75–100	50–75	10–25
Ecl XI	25–50	**100**	25–50	25–50	50–75
Eco 47 III	25–50	50–75	0–10	25–50	**100**
Eco RI	100	100	25–50	50–75	**100**
Eco RII	50–75	75–100	0–25	50–75	**100**
Eco RV	25–50	**100**	0–10	25–50	50–75
Fok I	100	50–75	75–100	**100**	25–50
Hae II	**100**	50–75	25–50	50–75	10–25
Hae III	50–75	50–75	75–100	**100**	25–50
Hind II	100	100	25–50	**100**	50–75
Hind III	50–75	**100**	25–50	100	50–75
Hinf I	100	100	50–75	75–100	**100**
Hpa I	**100**	25–50	25–50	50–75	25–50

Enzyme	A	B	L	M	H
Hpa II	50–75	25–50	**100**	50–75	10–25
Ita I	0–10	25–50	0–10	0–10	**100**
***Kpn* I	75–100	10–25	**100**	25–50	0–10
Ksp I	0–10	0–10	**100**	0–10	0–10
Ksp 632	**100**	0–10	25–50	10–25	0–10
**Mae* I	25–50	25–50	0–10	0–10	10–25
**Mae* II	0–10	25–50	0–10	25–50	75–100
**Mae* III	0–10	10–25	0–10	0–10	10–25
Mam I	75–100	75–100	75–100	75–100	**100**
Mlu I	10–25	25–50	0–10	10–25	**100**
Mlu NI	**100**	0–10	10–25	10–25	0–10
Mro I	**100**	0–10	50–75	50–75	0–10
Msp I	100	100	**100**	100	50–75
Mun I	50–75	0–10	100	**100**	10–25
Mva I	100	50–75	25–50	25–50	**100**
Mvn I	75-100	**100**	25–50	25-50	50–75
Nae I	**100**	0–10	100	0–10	0–10
Nar I	**100**	75–100	75–100	50–75	0–10
Nco I	50–75	50–75	50–75	50–75	**100**
Nde I	25–50	100	10–25	50–75	**100**
**Nde* II	10–25	10–25	0–10	0–10	10–25
Nhe I	100	25–50	100	**100**	10–25
Not I	10–25	50–75	0–10	25–50	**100**
Nru I	10–25	**100**	0–10	10–25	75–100
Nsi I	50–75	100	10–25	50–75	**100**
Nsp I	25–50	50–75	75–100	**100**	0–10
Pin AI	100	**100**	10–25	50–75	50–75
Pst I	25–50	25–50	10–25	25–50	**100**
Psp 1406	100	100	**100**	10–25	0–10
Pvu I	50–75	75–100	25–50	50–75	**100**
Pvu II	25–50	25–50	25–50	**100**	25–50
Rca I	75–100	**100**	25–50	50–75	25–50
Rsa I	100	50–75	**100**	50–75	0–10
Rsr II	75–100	10–25	**100**	75–100	0–10
Sac I	**100**	0–10	100	50–75	0–10
Sal I	0–10	25–50	0–10	10–25	**100**
Sau I	50–75	100	0–10	50–75	10–25
Sau 3A	**100**	25–50	25–50	75–100	0–10
Sau 96 I	**100**	50–75	25–50	25–50	25–50
Sca I	0–10	100	0–10	75–100	**100**
Scr FI	10–25	**100**	10–25	10–25	50–75
Sex AI	100	**100**	50–75	50–75	25–50
Sfi I	25–50	25–50	75–100	**100**	25–50
Sfu I	25–50	50–75	10–25	25–50	**100**
Sgr AI	**100**	0–10	100	10–25	0–10
Sma I	**100**	0–10	0–10	0–10	0–10
Sna BI	75–100	25–50	100	**100**	10–25
Spe I	75–100	75–100	75–100	100	**100**
Sph I	50–75	75–100	25–50	**100**	75–100
Ssp I	75–100	75–100	10–25	75–100	**100**
Ssp BI	100	**100**	10–25	50–75	10–25
Stu I	100	**100**	100	75–100	50–75
Sty I	50–75	100	10–25	75–100	**100**
Swa I	0–10	10–25	0–10	0–10	**100**
Taq I	50–75	**100**	25–50	50–75	50–75
Tru 9 I	100	25–50	100	**100**	25–50
Van 91 I	25–50	**100**	0–10	25–50	0–10
Xba I	100	75–100	75–100	75–100	**100**
Xho I	25–50	75–100	10–25	25–50	**100**
Xho II	50–75	25–50	**100**	75–100	0–10
Xma CI	50-75	0-10	**100**	75-100	0-10

Table 4: This table states the percentage activity of Roche Diagnostics restriction enzymes in each of the 5 SuRE/Cut buffers. The preferred buffer for each enzyme is printed in bold. Correct usage of this buffer system will prevent nonspecific side effects - such as star activity - that can occur under suboptimal reaction conditions.

Each restriction enzyme is supplied with a complementary vial of its own function-tested SuRE/Cut buffer, 10x concentrated.

* *Mae* I, *Mae* II, *Mae* III and *Nde* II require special incubation buffers for optimal activity which are supplied with each of these in form of a 2 × concentrated reaction buffer.

** Requires addition of bovine serum albumin, 100 μg/ml.

References

1 Maniatis, T. *et al.,* (1982) in Molecular Cloning, A Laboratory Manual, Cold Spring Harbor Laboratory.
2 O'Farrell, P. H. *et al.* ,(1980) *Mol. Gen. Genet.* **179,** 421.
3 Rebase The Restriction Enzyme Database: http://rebase.neb.com
4 Benchmate: http://roche.com/benchmate

Ordering Information

Product	Application	Packsize	Cat. No.
Restriction Enzymes	DNA restriction digestion	Please refer to website or catalogue	
Rapid DNA Ligation Kit	Ligation of sticky- or blunt-ended DNA fragments in just 5 min at 15 - 25°C.	Kit (40 DNA ligations)	11 635 379 001
T4 DNA Ligase	Ligation of sticky- and blunt- ended DNA fragments.	100 U 500 units (1 U/µl)	10 481 220 001 10 716 359 001
rAPid Phosphatase	Dephosphorylation of 5´-phosphate residues from nucleic acids	1000 U 5000 U	04 898 133 001 04 898 141 001
rAPid Dephos and Ligation Kit	Dephosphorylation of nucleic acids.	40 reactions 160 reactions	04 898 117 001 04 898 125 001
Alkaline Phosphatase (AP), special quality for molecular biology	Dephosphorylation of 5´-phosphate residues from nucleic acids.	1000 U (20 U/µl)	11 097 075 001
Agarose MP	Multipurpose agarose for analytical and preparative electrophoresis of nucleic acids	100 g 500 g	11 388 983 001 11 388 991 001
Agarose LE	Separation of nucleic acids in the range 0.2 - 1.5 kbp	100 g 500 g	11 685 660 001 11 685 678 001
Agarose Gel DNA Extraction Kit	For the elution of DNA fragments from agarose gels.	1 Kit (max. 100 reactions)	11 696 505 001
High Pure PCR Product Purification Kit	Purification of PCR or enzymatic modification reaction (*e.g.* restriction digest)	50 purifications 250 purifications	11 732 668 001 11 732 676 001
SuRE/Cut Buffer Set for Restriction Enzymes	Incubation buffers A, B, L, M and H for restriction enzymes	1 ml each (10× conc. solutions)	11 082 035 001
SuRE/Cut Buffer A	Restriction enzyme incubation	5 × 1 ml (10× conc. solution)	11 417 959 001
SuRE/Cut Buffer B	Restriction enzyme incubation	5 × 1 ml (10× conc. solution)	11 417 967 001
SuRE/Cut Buffer H	Restriction enzyme incubation	5 × 1 ml (10× conc. solution)	11 417 991 001
SuRE/Cut Buffer L	Restriction enzyme incubation	5 × 1 ml (10× conc. solution)	11 417 975 001
SuRE/Cut Buffer M	Restriction enzyme incubation	5 × 1 ml (10× conc. solution)	11 417 983 001
Water, PCR Grade	Specially purified, double-distilled, deionized, and autoclaved	100 ml (4 vials of 25 ml) 25 ml (25 vials of 1 ml) 25 ml (1 vial of 25 ml)	03 315 843 001 03 315 932 001 03 315 959 001
BSA, special quality for molecular biology	Maintaining enzyme stability	20 mg (1 ml)	10 711 454 001

Printed Materials You can view the following manuals on our website:

Laminated Buffer Chart
Lab FAQS "Find a Quick Solution"
Restriction Enzyme FAQS and Ordering Guide
Molecular Weight Markers for Nucleic Acids
Poster "Rec. Sequences of Restriction Enzymes"

Changes to previous version Editorial changes.

ICommonly used bacterial strains

Strain	Genotype
BL21	*E. coli B F$^-$ dcm ompT hsdS(r_B- m_B-) gal* (Studier, F.W. et al (1986) *J. Mol. Biol.*, **189,** 113.)
C600^e	*supE44 hsdR2 thi-1 thr-1 leuB6 lacY1 tonA21*; (Hanahan, D. (1983) *J. Mol. Biol.* **166**, 557.)
DH5α	*supE44* Δ(*lac*U169 (φ80d*lacZ*ΔM15) *hsd*R17 *rec*A1 *end*A1 *gyr*A96 *thi*-1 *rel*A1; (Hanahan, D. (1983) *J. Mol. Biol.* **166**, 557.)
HB101	*supE44 hsdS20 recA13 ara-14 proA2 lacY1 galK2 rpsL20 xyl-5 mtl-1*; (Hanahan, D., (1983) *J. Mol. Biol.* **166**, 557.)
JM108	*recA1 supE44 endA1 hsdR17 gyrA96 relA1 thi* Δ(*lac-pro*AB); (Yanisch- Perron, C. et al., (1985) *Gene* **33**, 103.)
JM109	*recA1 supE44 endA1 hsdR17 gyrA96 relA1 thi* Δ(*lac-pro*AB) F'[*traD36proAB*$^+$, *lacI*^{q} *lacZ*ΔM15]; (Yanisch- Perron, C. et al., (1985) *Gene* **33**, 103.)
JM110	*rpsL (Str^r) thr leu thi-l lacY galK galT ara tonA tsx dam dcm supE44 Δ(lac-proAB) F'[traD36proAB$^+$, lacI^q lacZΔM15];* (Yanisch- Perron, C. et al., (1985) *Gene* **33**, 103.)
K802	*supE hsdR gal metB;* (Raleigh, E. et al., (1986) Proc.Natl. Acad.Sci USA, 83, 9070.; Wood, W.B. (1966) J. Mol. Biol., **16**, 118.)
SURE^r	*recB recJ sbc C201 uvrC umuC::Tn5(kan^r) lac* , Δ(hsdRMS) endA1 gyrA96 thi relA1 supE44 F'[proAB$^+$ lacI^q lacZΔM15 Tn10 (tet^r); (Greener, A. (1990) Stratagies, **3**, 5.)
TG1	*supE hsd Δ5 thi* Δ(*lac-pro*AB) F'[*traD36proAB*$^+$, *lacI*^{q} *lacZ*ΔM15]; (Gibson, T.J. (1984) PhD Theses. Cambridge University, U.K.)
XL1-Blue^r	*supE44 hsdR17 recA1 endA1 gyrA46 thi relA1 lac* F'[*proAB*$^+$, *lacI*^{q} *lacZ*ΔM15 Tn10 *(tet^r)*]; (Bullock et al., (1987) BioTechniques, 5, 376.)

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