Now includes
Q5U® Hot Start High-Fidelity DNA Polymerase

PCR Reagents

POLYMERASES, NUCLEOTIDES, & DNA LADDERS

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For over 25 years, New England Biolabs has been committed to the development of innovative, high quality tools for your PCR, qPCR and related amplification technologies. Our product quality, enzyme expertise and outstanding technical support bring unparalleled confidence to your experiments. Find out at **nebpcr.com.**

Featured Products Include:

- **Luna® qPCR & RT-qPCR Reagents:**
  for rapid, sensitive and precise detection of RNA, DNA and cDNA targets
- **Q5 High-Fidelity DNA Polymerase:**
  for robust, ultra high-fidelity PCR
- **One*Taq* DNA Polymerase:**
  for robust, routine PCR
- **ProtoScript® II Reverse Transcriptase:**
  for efficient reverse transcription
- ***Bst* DNA Polymerases and WarmStart® LAMP Products:**
  for robust isothermal amplification
- **Exo-CIP Rapid PCR Cleanup Kit:**
  for rapid degradation of PCR primers and dephosphorylation of dNTPs following amplification
- **dNTPs:**
  ultrapure solution sets and mixes for a variety of applications

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Find an overview of PCR.

*see back cover for details

TABLE OF CONTENTS

Related Resources at neb.com:

- Visit **LUNAqPCR.com** to learn more about the Luna portfolio of products for qPCR & RT-qPCR
- Visit **www.neb.com/isoamp** to find a wide range of tools for isothermal amplification, including *Bst* DNA Polymerases, WarmStart RTx, unique enzymes and master mixes supporting LAMP, SDA/NEAR, WGA/MDA, RPA and other methods
- Visit **NEBrna.com** to find products supporting RNA workflows
- Visit **www.neb.com/supporting-molecular-diagnostics** to find amplification-based products for molecular diagnostic applications

PCR Polymerase Selection Chart

When choosing a polymerase for PCR, we recommend starting with One*Taq*® or Q5® DNA Polymerases (shown below in gold). Both offer robust amplification and can be used on a wide range of templates (routine, AT- and GC-rich). Q5 provides the benefit of maximum fidelity, and is also available in a formulation specifically optimized for next generation sequencing.

★ indicates recommended choice for application

	STANDARD PCR		HIGH-FIDELITY PCR			SPECIALTY PCR			
			HIGHEST FIDELITY		MODERATE FIDELITY	LONG AMPLICONS	dU TOLERANCE		BLOOD DIRECT PCR
	One*Taq*®/ One*Taq* Hot Start	*Taq* / Hot Start *Taq*	Q5®/Q5 Hot Start	Phusion®[4]/ Phusion[4] Flex	Vent®/ Deep Vent™	LongAmp®/ LongAmp Hot Start *Taq*	Epimark® Hot Start *Taq*	Q5U®	Hemo KlenTaq®
PROPERTIES									
Fidelity vs. *Taq*	2X	1X	~280X[2]	> 39X	5–6X	2X	1X	ND	ND
Amplicon Size	< 6 kb	≤ 5 kb	≤ 20 kb	≤ 20 kb	≤ 6 kb	≤ 30 kb	≤ 1 kb	app-specific	≤ 2 kb
Extension Time	1 kb/min	1 kb/min	6 kb/min	4 kb/min	1 kb/min	1.2 kb/min	1 kb/min	2 kb/min	0.5 kb/min
Resulting Ends	3´ A/Blunt	3´ A	Blunt	Blunt	Blunt	3´ A/Blunt	3´ A	Blunt	3´ A
3´→5´ exo	Yes	No	Yes	Yes	Yes	Yes	No	Yes	No
5´→3´ exo	Yes	Yes	No	No	No	Yes	Yes	No	No
Units/50 µl Reaction	1.25	1.25	1.0	1.0	0.5–1.0	5.0	1.25	1.0	N/A
Annealing Temperature	Tm-5	Tm-5	Tm+3	Tm+3	Tm-5	Tm-5	Tm-5	Tm-3	Tm-5
APPLICATIONS									
Routine PCR	★	●	●	●	●	●			
Colony PCR	★	●							
Enhanced Fidelity	●		★	●	●	●			
High Fidelity			★	●					
High Yield	★	●	★	●					
Fast			★	●					
Long Amplicon			★	●		★			
GC-rich Targets	★		★		●	●			
AT-rich Targets	★	●	★	●		●	●	★	
High Throughput	●	●	●	●			●	★	
Multiplex PCR	●	★[1]	●	●					
Extraction-free PCR									
DNA Labeling		★							
Site-directed Mutagenesis			★	●					
Carryover Prevention							●	★	
USER® Cloning							●	★	
NGS APPLICATIONS									
NGS Library Amplification			★[3]	●			★[5]		
FORMATS									
Hot Start Available	●	●	●	●		●	●	●	
Kit		●	●	●		●		●	
Master Mix Available	●	●	●	●		●		●	
Direct Gel Loading	●	●							

(1) Use Multiplex PCR 5X Master Mix.

(2) Due to the very low frequency of misincorporation events being measured, the error rate of high-fidelity enzymes like Q5 is challenging to measure in a statistically significant manner. We continue to investigate improved assays to characterize Q5's very low error rate to ensure that we present the most robust accurate fidelity data possible (Popatov, V. and Ong, J.L. (2017) PLoS One, 12(1):e0169774. doi 10.1371/journal. pone. 0169774).

(3) Use NEBNext High-Fidelity 2X PCR Master Mix.

(4) Phusion DNA Polymerase was developed by Finnzymes Oy, now a part of Thermo Fisher Scientific. This product is manufactured by New England Biolabs, Inc. under agreement with, and under the performance specifications of Thermo Fisher Scientific.

(5) Use NEBNext Enzymatic Methyl-seq Kit (EM-seq™) for Illumina.

DOWNLOAD THE NEB AR APP*

Why choose Q5 for your PCR?

*see back cover for details

Q5® High-Fidelity DNA Polymerase
Q5 Hot Start High-Fidelity DNA Polymerase

Q5 High-Fidelity DNA Polymerase sets a new standard for both fidelity and performance. With the highest fidelity amplification available (~280X higher than *Taq* and > 5X higher than Thermo Scientific® Phusion®), Q5 DNA Polymerase results in ultra-low error rates. Q5 DNA Polymerase is composed of a novel polymerase that is fused to the processivity-enhancing Sso7d DNA binding domain, improving speed, fidelity and reliability of performance.

In contrast to chemically-modified or antibody-based hot start polymerases, NEB's Q5 Hot Start utilizes a unique synthetic aptamer. This structure binds to the polymerase through non-covalent interactions, blocking activity during the reaction setup. The polymerase is activated during normal cycling conditions, allowing reactions to be set up at room temperature. Q5 Hot Start does not require a separate high temperature activation step, shortening reaction times and increasing ease-of-use. Q5 Hot Start is an ideal choice for high specificity amplification and provides robust amplification of a wide variety of amplicons, regardless of GC content.

Also available: Q5 High-Fidelity DNA Polymerase optimized for NGS applications. Visit **NEBNext.com** for details.

Q5 High-Fidelity DNA Polymerase	M0491S/L
Q5 High-Fidelity 2X Master Mix	M0492S/L
Q5 Hot Start High-Fidelity DNA Polymerase	M0493S/L
Q5 Hot Start High-Fidelity 2X Master Mix	M0494S/L
Q5 High-Fidelity PCR Kit	E0555S/L
NEBNext® High-Fidelity 2X PCR Master Mix	M0541S/L
NEBNext Ultra™ II Q5 Master Mix	M0544S/L
Q5U Hot Start High-Fidelity DNA Polymerase	M0515S/L
NEBNext Q5U Master Mix	M0597S/L

Extension Rate	6 kb/min
Amplicon Size	≤ 20 kb
Fidelity	~280X *Taq*
Units/50 µl rxn	1 unit
Resulting Ends	Blunt
3´→5´ Exonuclease Activity	Yes
5´→3´ Exonuclease Activity	No
Supplied Buffer	Q5 Rxn Buffer
Supplied Enhancer	Q5 High GC Enhancer
Compatible w/Other Buffers	with Reduced Activity Profile

Product Formats

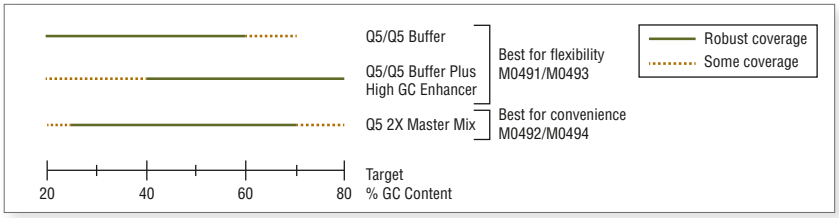
Hot Start Available	Yes
- Activation Required	No
Master Mix Available	Yes
PCR Kit Available	Yes
NGS Version Available	Yes

Applications

High-Fidelity PCR	Yes
Difficult PCR	Yes
High GC PCR	Yes
T/A, U/A Cloning	No
Colony PCR	No
Blunt Cloning	Yes

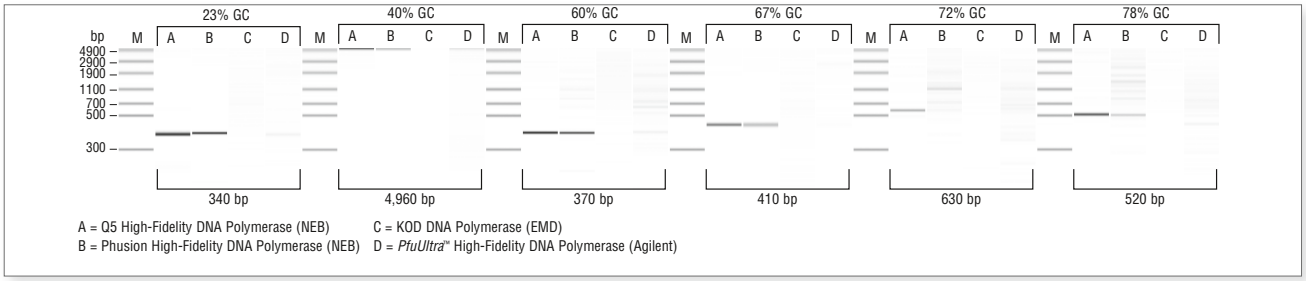
Learn how Q5 can be used in multiplex PCR in our application note at Q5PCR.com

Q5 DNA Polymerases offer exceptional coverage over the entire range of GC composition



The stand-alone enzyme comes with a reaction buffer that supports robust amplification of high AT to routine targets. Addition of the High GC Enhancer allows amplification of GC rich and difficult targets. For added convenience, the master mix formats allow robust amplification of a broad range of targets with a single formulation.

Q5 DNA Polymerase offers superior amplification for a wide range of templates, even with high GC content



Amplification of a variety of human genomic amplicons from low to high GC content demonstrates the broad performance of Q5 High-Fidelity DNA Polymerase. All reactions were conducted using 20 ng of input template and included 30 cycles of amplification. Results were visualized by microfluidic LabChip® analysis. Competitor polymerases were cycled according to manufacturer's recommendations. For the final three amplicons, GC Buffers or enhancers were used when supplied with the polymerase.

Comparison of high-fidelity polymerases

PRODUCT NAME (SUPPLIER)	POLYMERASE FIDELITY (Reported by supplier)	MAXIMUM AMPLICON LENGTH[5]	EXTENSION TIME[5] (For simple templates[4])	EXTENSION TIME[5] (For complex templates[4])
Q5 High-Fidelity DNA Polymerase (NEB)	~280X *Taq*[1]	20 kb simple; 10 kb complex	10 s/kb	10 s/kb (< 1 kb) 20–30 s/kb (> 1 kb)
Phusion High-Fidelity DNA Polymerase* (NEB)	39X *Taq*[1]	20 kb simple; 10 kb complex	15 s/kb	30 s/kb
AccuPrime™ *Pfx* (Life)	26X *Taq*[2]	12 kb[3]	60 s/kb[3]	
PfuUltra™ II Fusion HS (Agilent)	20X *Taq*[2]	19 kb[3]	15 s/kb (< 10 kb[3]) 30 s/kb (> 10 kb[3])	
PfuUltra High-Fidelity DNA Polymerase (Agilent)	19X *Taq*[2]	17 kb simple; 6 kb complex	60 s/kb (< 10 kb) 120 s/kb (> 10 kb)	60 s/kb (< 6 kb) 120 s/kb (> 6 kb)
KOD DNA Polymerase (EMD)	12X *Taq*[1]	6 kb simple; 2 kb complex	10–20 s/kb	30–60 s/kb
Platinum® *Taq* HiFi (Life)	6X *Taq*[2]	20 kb[3]	60 s/kb[3]	

1 We continue to investigate improved assays to characterize Q5's very low error rate to ensure that we present the most accurate fidelity data possible (Potapov, V. and Ong, J.L. (2017) PLoS ONE. 12(1): e0169774.).

2 PCR-based mutation screening in lacZ (NEB), lacI (Agilent) or rpsL (Life)

3 Template not specified.

4 Simple templates include plasmid, viral and *E. coli* genomic DNA. Complex templates include plant, human and other mammalian genomic DNA.

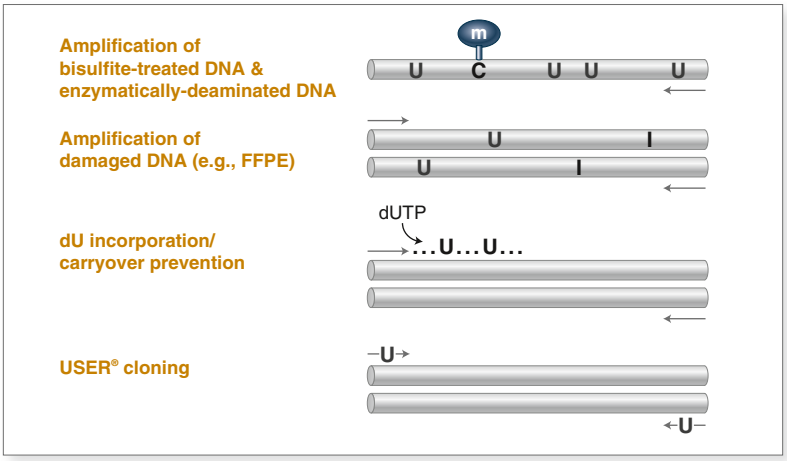
5 Values provided by individual manufacturers.

* Phusion DNA Polymerase was developed by Finnzymes Oy, now a part of Thermo Fisher Scientific.

Q5U® Hot Start High-Fidelity DNA Polymerase

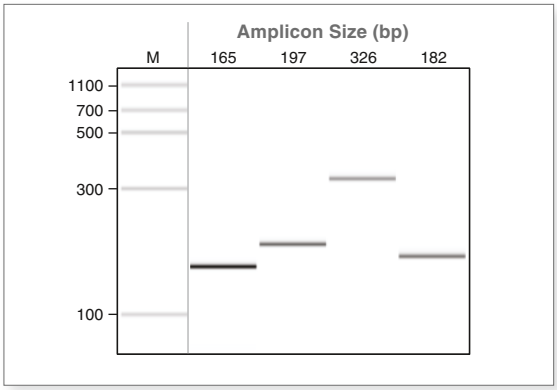
Q5U Hot Start High-Fidelity DNA Polymerase is a modified version of Q5 High-Fidelity DNA Polymerase, a novel thermostable DNA polymerase that possesses 3′ to 5′ exonuclease activity, and is fused to a processivity-enhancing Sso7d domain. Q5U contains a mutation in the uracil-binding pocket enables the ability to read and amplify templates containing uracil and inosine bases. Q5U contains a unique aptamer selected for polymerase inhibition at room temperature and optimal amplification during typical PCR conditions.

Common applications enabled by Q5U Hot Start High-Fidelity DNA Polymerase



Archaeal family B-type polymerases can incorporate/tolerate a variety of modified nucleotides but will stall upon encountering uracil and inosine residues. Q5U Hot Start High-Fidelity DNA Polymerase is a modified Q5 High-Fidelity DNA polymerase, which efficiently incorporates dUTP and amplifies uracil-containing templates.

Q5U Hot Start High-Fidelity DNA Polymerase enables robust amplification of FFPE-treated normal lung DNA



Amplification of FFPE normal lung DNA (Biochain). Amplicon sizes are indicated above the gel. Each 25 µl reaction contained 18 ng of FFPE DNA. Cycling conditions were consistent with recommendations for this sample type and reactions were visualized by microfluidic LabChip analysis.

One*Taq*® DNA Polymerase
One*Taq* Hot Start DNA Polymerase

An optimized blend of *Taq* and Deep Vent DNA polymerases, One*Taq* and One*Taq* Hot Start DNA Polymerases offer robust amplification across a wide range of templates. The 3´→5´ exonuclease activity of Deep Vent DNA Polymerase increases the fidelity and robustness of *Taq*. Additionally, One*Taq* Reaction Buffers and High GC Enhancer have been formulated for robust yields with minimal optimization, regardless of a template's GC content.

One*Taq* DNA Polymerase is supplied with two 5X buffers (Standard and GC), as well as a High GC Enhancer solution. For most routine, AT- rich or complex amplicons with up to ~65% GC content, One*Taq* Standard Reaction Buffer provides robust amplification. For GC-rich amplicons, the One*Taq* GC Reaction Buffer can improve both performance and yield. For particularly high GC (> 65%) or difficult amplicons, the One*Taq* High GC Enhancer can be added to reactions containing One*Taq* GC Buffer. These formulations ensure maximum performance for routine, AT- or GC-rich amplicons.

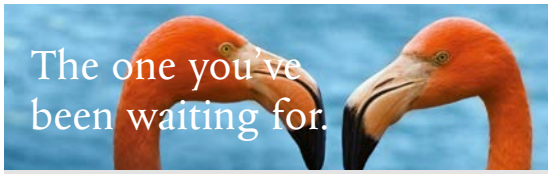
Master Mix Formulations

In addition to standalone enzymes, both One*Taq* and One*Taq* Hot Start DNA Polymerases are available in master mix and Quick-Load master mix formats. Master mix formulations include dNTPs, $MgCl_2$ and other buffers and stabilizers. The Quick-Load master mix formulations also include two tracking dyes for use with downstream visualization (i.e., agarose gels). With these convenient formats, the addition of primers and template are all that is required for robust amplification.

One*Taq* DNA Polymerase	M0480S/L/X
One*Taq* 2X Master Mix with Standard Buffer	M0482S/L
One*Taq* Quick-Load 2X Master Mix with Standard Buffer	M0486S/L
One*Taq* Quick-Load DNA Polymerase	M0509S/L

One*Taq* Buffer Recommendations

AMPLICON % GC BUFFER	RECOMMENDED DEFAULT BUFFER	OPTIMIZATION NOTES
< 50% GC	One*Taq* Standard Reaction Buffer	Adjust annealing temperature, primer/template concentration, etc. if needed.
50–65% GC	One*Taq* Standard Reaction Buffer	One*Taq* GC Reaction Buffer can be used to enhance performance of difficult amplicons.
> 65% GC	One*Taq* GC Reaction Buffer	One*Taq* GC Reaction Buffer with 10–20% One*Taq* High GC Enhancer can be used to enhance performance of difficult amplicons.



Extension Rate	1 kb/min
Amplicon Size	≤ 6 kb
Fidelity	2X *Taq*
Units/50 µl rxn	1.25 units
Resulting Ends	3´ A/Blunt
3´→5´ Exonuclease Activity	Yes
5´→3´ Exonuclease Activity	Yes
Supplied Buffer	One*Taq* Std Rxn Buffer, One*Taq* GC Rxn Buffer
Supplied Enhancer	One*Taq* High GC Enhancer
Compatible w/Other Buffers	with Reduced Activity Profile

Product Formats

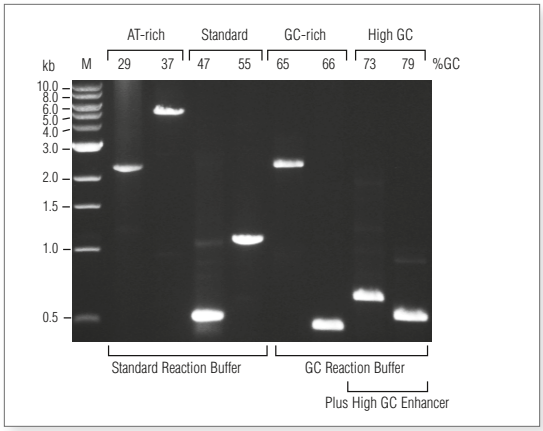
Hot Start Available	Yes
- Activation Required	No
Master Mix Available	Yes
Direct Gel-loading Available	Yes
PCR Kit Available	No

Applications

Routine PCR	Yes
SNP Detection	Yes
T/A, U/A Cloning	Yes
Colony PCR	Yes

Visit www.neb.com/One*Taq* for more information.

Achieve robust amplification for routine, AT- and GC-rich templates with One*Taq*



Amplification of a selection of sequences with varying AT and GC content from human and C. elegans genomic DNA using OneTaq DNA Polymerase. GC content is indicated above gel. Marker M is the 1 kb DNA Ladder (NEB #N3232).

One*Taq* Hot Start DNA Polymerase allows room temperature reaction setup with no separate activation step

In contrast to chemically-modified or antibody-based hot start polymerases, NEB's One*Taq* Hot Start utilizes aptamer technology. This aptamer/inhibitor binds to the polymerase through non-covalent interactions, blocking polymerase activity at temperatures below 45°C. The polymerase is activated during normal cycling conditions, allowing reactions to be set up at room temperature. One*Taq* Hot Start DNA Polymerase does not require a separate high temperature incubation step to activate the enzyme and can be used in typical *Taq*-based cycling protocols. This ultimately shortens reaction times and increases ease of use.

One*Taq* Hot Start DNA Polymerase M0481S/L/X
One*Taq* Hot Start 2X Master Mix with Standard Buffer M0484S/L
One*Taq* Hot Start 2X Master Mix with GC Buffer M0485S/L
One*Taq* Hot Start Quick-Load 2X Master Mix with Standard Buffer M0488S/L
One*Taq* Hot Start Quick-Load 2X Master Mix with GC Buffer M0489S/L

To learn how One*Taq* can be used in colony PCR, download the application note at www.neb.com/One*Taq*

Comparison of One*Taq* Hot Start DNA Polymerase to other commercially available hot start polymerases.

Polymerase	Additives	GC% 55	65	66	67	78	79
One*Taq*® DNA Polymerase (NEB)	None*						
One*Taq* HotStart DNA Polymerase (NEB)	None*						
AmpliTaq Gold® 360 DNA Polymerase (Thermo Fisher)	None						
	360 GC Enhancer						
DreamTaq® Hot Start DNA Polymerase (Thermo Fisher)	(Not provided)						
FastStart™ Taq DNA Polymerase (Roche)	None						
	GC-RICH solution						
GoTaq® G2 Hot Start Polymerase (Promega)	(Not provided)						
GoTaq Hot Start Polymerase (Promega)	(Not provided)						
HotStarTaq® DNA Polymerase (Qiagen)	Q-Solution						
	None						
HotStarTaq Plus DNA Polymerase (Qiagen)	Q-Solution						
	None						
iTaq™ DNA polymerase (Bio-Rad)	(Not provided)						
JumpStart™ Taq DNA Polymerase (Sigma)	None						
Platinum™ II Taq Hot-Start DNA Polymerase (Thermo Fisher)	Platinum GC Enhancer						
	None						
Platinum Taq DNA Polymerse High Fidelity (Thermo Fisher)	(Not provided)						
Platinum Taq DNA Polymerase (Thermo Fisher)	None						
	KB Extender						
Ex Taq® DNA Polymerase, hot-start version (TaKaRa)	(Not provided)						
Titanium™ Taq DNA Polymerase (TaKaRa)	(Not provided)						

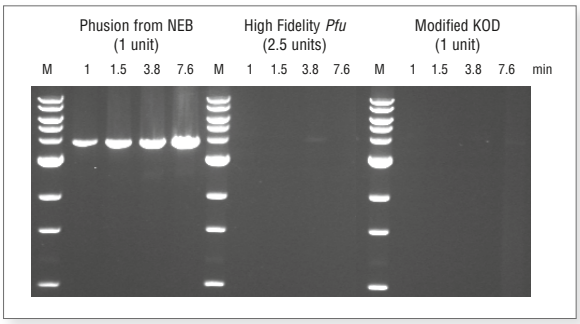
* One*Taq* products are supplied with One*Taq* Standard Reaction Buffer and One*Taq* GC Reaction Buffer. The GC reaction buffer was used to amplify the targets shown in the table. For other products, amplification reactions were conducted both with and without GC enhancers (if provided).

Phusion® High-Fidelity DNA Polymerase

DNA polymerases with high fidelity are important for applications in which the DNA sequence needs to be correct after amplification. Manufactured and quality controlled at New England Biolabs, Thermo Scientific Phusion High-Fidelity DNA Polymerase offers both high fidelity and robust performance, and thus can be used for all PCR applications. Its unique structure, a novel *Pyrococcus*-like enzyme fused with a processivity-enhancing domain, increases fidelity and speed. Product selection includes a standalone enzyme, master mix and kit format, as well as a choice of reaction buffers for amplification of difficult templates. Phusion Hot Start Flex DNA Polymerase is available as standalone enzyme or in a master mix format and enables high specificity amplification of a broad range of templates with the flexibility of room temperature setup.

Phusion High-Fidelity DNA Polymerase M0530S/L
Phusion High-Fidelity PCR Kit E0553S/L
Phusion High-Fidelity PCR Master Mix with HF Buffer M0531S/L
Phusion High-Fidelity PCR Master Mix with GC Buffer M0532S/L
Phusion Hot Start Flex M0535S/L
Phusion Hot Start Flex 2X Master Mix M0536S/L

Phusion DNA Polymerase generates amplicons with high yield and much shorter extension times



A 3.8 kb fragment was amplified from 50 ng of Jurkat gDNA using different polymerases. Reactions were carried out according to the manufacturer's recommended conditions. Extension times are indicated (in minutes). Ladder M is a 1 kb DNA Ladder (NEB #N3232).

Phusion Buffer Selection Chart

CHOICE OF BUFFER	APPLICATION	NEB #
Phusion HF Buffer Pack	Default buffer for high-fidelity amplification	B0518S
Phusion GC Buffer Pack	For long, difficult or GC-rich templates (when HF buffer fails)	B0519S

Phusion DNA Polymerase was developed by Finnzymes Oy, now a part of Thermo Fisher Scientific.

POLYMERASE DETAILS

Extension Rate ..... 4 kb/min
Amplicon Size ..... ≤ 20 kb
Fidelity ..... 39X *Taq*
Units/50 µl rxn ..... 1 units
Resulting Ends ..... Blunt
3´→5´ Exonuclease Activity ..... Yes
5´→3´ Exonuclease Activity ..... No
Supplied Buffer ..... 5X Phusion HF Buffer, 5X Phusion GC Buffer
Supplied Enhancer ..... 100% DMSO
Compatible w/Other Buffers ..... No

Product Formats

Hot Start Available ..... Yes
- Activation Required ..... No
Master Mix Available ..... Yes
PCR Kit Available ..... Yes

Applications

High-Fidelity PCR ..... Yes
T/A, U/A Cloning ..... No
Colony PCR ..... No
Blunt Cloning ..... Yes

High-fidelity polymerases benefit from a $Tm^{+}3$ annealing temperature. Use the NEB Tm Calculator to ensure successful PCR at TmCalculator.neb.com.

Taq DNA Polymerase

For routine amplification, where cost per reaction and yield are the priorities, *Taq* DNA Polymerase is the industry standard. NEB provides high quality recombinant *Taq* at an exceptional value. To accommodate a variety of PCR applications, *Taq* is available with different reaction buffers. Standard *Taq* Buffer is designed to support existing PCR platforms and is an ideal choice for DHPLC and high-throughput applications. ThermoPol Buffer is formulated to promote high product yields, even under demanding conditions.

Taq DNA Polymerase with Standard *Taq* Buffer	M0273S/L/X/E
Taq DNA Polymerase with Standard *Taq* (Mg-free) Buffer	M0320S/L
Taq DNA Polymerase with ThermoPol Buffer	M0267S/L/X/E
Taq PCR Kit	E5000S
Taq 5X Master Mix	M0285L
Taq 2X Master Mix	M0270L
Quick-Load *Taq* 2X Master Mix	M0271L
Hot Start *Taq* DNA Polymerase	M0495S/L
Hot Start *Taq* 2X Master Mix	M0496S/L

Looking for a hot start *Taq* for use in molecular diagnostics?
Contact us at **custom@neb.com**

Taq Buffer Selection Chart

CHOICE OF BUFFER	MG-CONTROL	NEB #
Standard *Taq* Reaction Buffer: Detergent-free and designed to be compatible with existing assay systems	*Taq* with Standard *Taq* Buffer	M0273S/L/X
	Taq with Standard *Taq* (Mg-free) Buffer	M0320S/L
ThermoPol Buffer: Designed to optimize yields and specificity	*Taq* with ThermoPol Buffer	M0267S/L/X/E

POLYMERASE DETAILS

Extension Rate	1 kb/min
Amplicon Size	≤ 5 kb
Units/50 µl rxn	1.25 units
Resulting Ends	3´ A
3´→5´ Exonuclease Activity	No
5´→3´ Exonuclease Activity	Yes
Supplied Buffer	Standard *Taq* Rxn Buffer, or ThermoPol Rxn Buffer
Compatible w/Other *Taq* Buffers	Yes

Product Formats

Hot Start Available	Yes
- Activation Required	No
Master Mix Available	Yes
Direct Gel-loading Available	Yes
PCR Kit Available	Yes

Applications

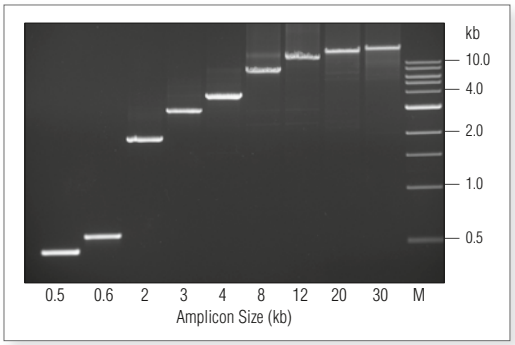
Routine PCR	Yes
SNP Detection	Yes
T/A, U/A Cloning	Yes
Colony PCR	Yes

LongAmp® *Taq* enables extension of longer amplicons

An optimized blend of *Taq* and Deep Vent DNA Polymerases, LongAmp *Taq* DNA Polymerase enables amplification of up to 30 kb PCR products with a fidelity higher than *Taq* DNA Polymerase alone.

LongAmp *Taq* DNA Polymerase	M0323S/L
LongAmp *Taq* PCR Kit	E5200S
LongAmp *Taq* 2X Master Mix	M0287S/L
LongAmp Hot Start *Taq* DNA Polymerase	M0534S/L
LongAmp Hot Start *Taq* 2X Master Mix	M0533S/L

Amplification of longer templates with LongAmp *Taq*



Amplification of specific sequences from human genomic DNA using LongAmp Taq DNA Polymerase. Amplicon sizes are indicated below gel. Marker M is NEB 1 kb DNA Ladder (NEB #N3232).

POLYMERASE DETAILS

Extension Rate	1.2 kb/min
Amplicon Size	≤ 30 kb
Fidelity	2X *Taq*
Units/50 µl rxn	5 units
Resulting Ends	3´ A/Blunt
3´→5´ Exonuclease Activity	Yes
5´→3´ Exonuclease Activity	Yes
Supplied Buffer	LongAmp or *Taq* Rxn Buffer
Compatible w/Other *Taq* Buffers	with Reduced Activity Profile

Product Formats

Hot Start Available	Yes
- Activation Required	No
Master Mix Available	Yes
Direct Gel-loading Available	Yes
PCR Kit Available	Yes

Applications

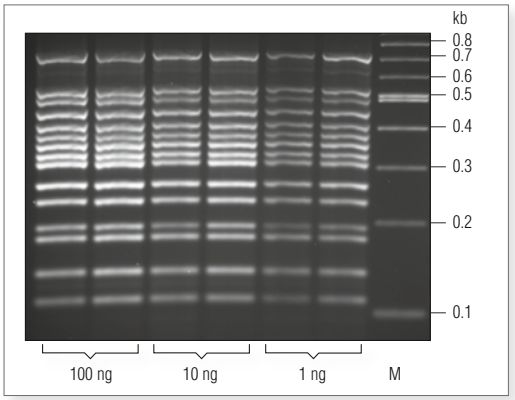
Long Amplicons	Yes
Routine PCR	Yes
T/A, U/A Cloning	Yes
Colony PCR	Yes

Multiplex PCR 5X Master Mix for multiple templates

Multiplex PCR can simultaneously detect two or more products in a single reaction. Multiplex PCR can also be used for semi-quantitative gene expression analysis using cDNA templates. The NEB Multiplex PCR 5X Master Mix is an easy-to-use solution featuring high quality recombinant *Taq* DNA Polymerase. The mix is optimized for high yield and performance. Its performance is illustrated below in a 15-plex PCR reaction using human genomic DNA. The 5X formulation allows maximal flexibility for input of custom primers and template DNAs.

Multiplex PCR 5X Master Mix	M0284S

15-plex PCR reaction



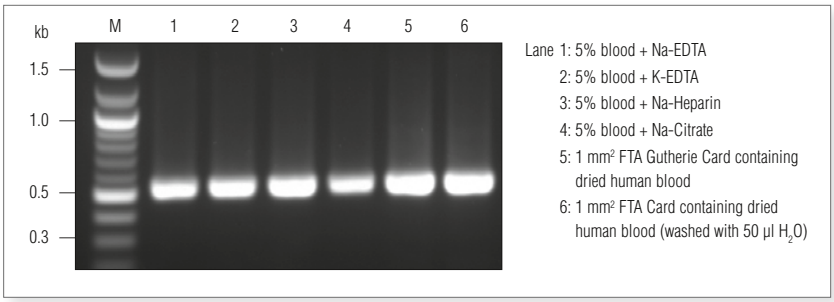
15-plex PCR using varying amounts of human genomic DNA. 1X Multiplex PCR 5X Master Mix was used with 0.15 µM of each primer. The cycling conditions were 95°C for 1 minute, 35 cycles of 95°C for 20 seconds, 60°C for 1 minute and 68°C for 2 minutes. Marker M is the 1 kb Plus DNA Ladder (NEB #N3200).

Hemo KlenTaq® for PCR from blood

Hemo KlenTaq is a truncated version of *Taq* DNA Polymerase that contains mutations, making it resistant to inhibitors present in whole blood. Hemo KlenTaq offers the versatility of *Taq* and can successfully amplify samples containing up to 20% whole blood from human and mouse sources in a 50 µl reaction volume.

Hemo KlenTaq M0332S/L

Amplification from human whole blood with Hemo Klen*Taq*



Percent blood present in sample and anticoagulant used are indicated in the legend. Ladder M is the 1 kb Plus DNA Ladder (NEB #N3200).

POLYMERASE DETAILS

Extension Rate	0.5 kb/min
Amplicon Size	≤ 2 kb
Units/50 µl rxn	4 units
Resulting Ends	3´A
3´→5´ Exonuclease Activity	No
5´→3´ Exonuclease Activity	No
Supplied Buffer	Hemo Klen *Taq* Rxn Buffer
Compatible w/Other Buffers	Yes

Applications

Extraction-free PCR	Yes
T/A, U/A Cloning	Yes
Cloning PCR	Yes

EpiMark® Hot Start *Taq* DNA Polymerase for bisulfite sequencing

EpiMark Hot Start *Taq* DNA Polymerase is a mixture of *Taq* DNA Polymerase and a temperature sensitive, aptamer-based inhibitor. This inhibitor binds reversibly to the enzyme, inhibiting polymerase activity below 45°C, but releases the enzyme during normal PCR cycling conditions. With a reaction buffer that has been optimized for AT-rich templates, EpiMark Hot Start *Taq* is an excellent choice for bisulfite-treated DNA.

EpiMark Hot Start *Taq* DNA Polymerase M0490S/L

POLYMERASE DETAILS

Extension Rate	1 kb/min
Amplicon Size	≤ 1 kb
Units/50 µl rxn	1.25 units
Resulting Ends	3´A
3´→5´ Exonuclease Activity	No
5´→3´ Exonuclease Activity	Yes
Supplied Buffer	Epimark Hot Start *Taq* Rxn Buffer
Compatible w/Other *Taq* Buffers	with Reduced Activity Profile

Product Formats

Hot Start Available	Yes
- Activation Required	No

Applications

A/T Rich Targets	Yes
Bisulfite-converted DNA	Yes
Routine PCR	Yes
T/A, U/A Cloning	Yes

PreCR® Repair Mix

The PreCR Repair Mix is a cocktail of enzymes formulated to repair damaged DNA *in vitro* prior to PCR. The repair pre-treatment can be applied to techniques such as whole genome amplification, DNA sequencing and microarray analysis.

The PreCR Repair Mix can repair a wide range of damaged DNA, resulting from exposure to heat, low pH, oxygen, and/or UV light. The lesions repaired by the PreCR Repair Mix do not include all possible types of damage. For example, it cannot repair DNA crosslinks, such as those that occur during exposure to formalin, nor can the mix effectively repair highly fragmented DNA.

PreCR Repair Mix M0309S/L

For repair of DNA prior to next generation sequencing library preparation, we recommend the NEBNext FFPE DNA Repair Mix (NEB #M6630). Visit NEBNext.com to learn more.

ADVANTAGES

- **Specific** - Treats damaged DNA without harming template
- **Versatile** - Can be used in conjunction with any thermophilic polymerase
- **Convenient** - PCR can be done directly on repair reaction
- **Flexible** - Suitable for PCR, microarrays and other DNA technologies

Exo-CIP™ Rapid PCR Cleanup Kit

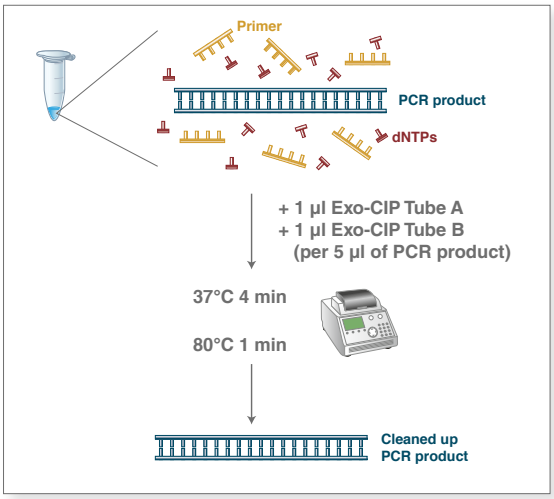
The Exo-CIP Rapid PCR Cleanup Kit contains optimized formulations of thermolabile Exonuclease I and thermolabile Calf Intestinal Phosphatase and is used to rapidly degrade residual PCR primers and dephosphorylate excess dNTPs after amplification. Degradation occurs in only 4 minutes at 37°C, and is immediately followed by rapid inactivation of the enzymes by heating for 1 minute at at 80°C. In just 5 minutes, the PCR product is ready for downstream analysis such as Sanger sequencing, SNP detection, or library preparation for NGS. The Exo-CIP Rapid PCR Cleanup Kit is compatible with all commonly-used reaction buffers.

Exo-CIP Rapid PCR Cleanup Kit E1050S/L

ADVANTAGES

- 5 minute protocol for enzymatic cleanup of primers and dNTPs
- Improves sequencing results, allowing longer reads

Exo-CIP Rapid PCR Cleanup Kit workflow.



1 µl of Exo-CIP Tube A (thermolabile Exo I) and 1 µl of Exo-CIP Tube B (thermolabile CIP) are added to the PCR product to degrade excess primers and dNTPs. The mixture is incubated at 37°C for 4 minutes, followed by a 1 minute incubation at 80°C to irreversibly inactivate both enzymes. The cleaned PCR product is ready for downstream applications or analysis.

Monarch® PCR & DNA Cleanup Kit (5 µg)

The Monarch PCR & DNA Cleanup Kit rapidly and reliably purifies up to 5 µg of concentrated, high-quality DNA from PCR and other enzymatic reactions. The kit utilizes a bind/wash/elute workflow with minimal incubation and spin times. The columns ensure zero buffer retention and no carryover of contaminants, enabling elution of sample in volumes as low as 6 µl. The buffers provided have been optimized, and do not require monitoring of pH. Eluted DNA is ready for use in restriction digests, DNA sequencing, ligation and other enzymatic manipulations. The protocol can also be modified to enable the purification of smaller DNA fragments, including oligonucleotides and ssDNA.

Monarch PCR & DNA Cleanup Kit T1030S/L

ADVANTAGES

- Elute in as little as 6 µl
- Prevent buffer retention and salt carryover with optimized column design
- Purify oligos and other small DNA fragments with simple protocol modification
- Save time with fast, user-friendly protocols
- Designed with sustainability in mind

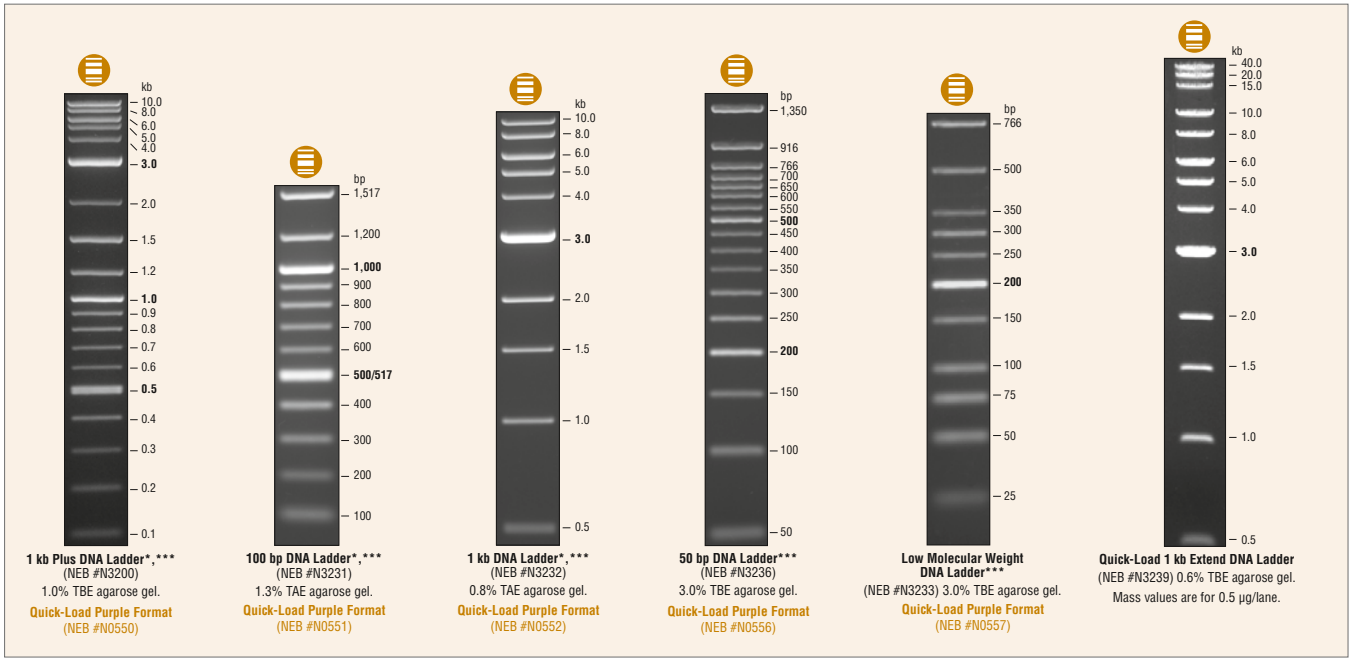
Nucleotide Solutions

PRODUCT NAME	DESCRIPTION	NEB #
Deoxynucleotide (dNTP) Solution Set	The Deoxynucleotide Solution Set contains four separate 100 mM solutions of ultrapure nucleotides (dATP, dCTP, dGTP, and dTTP).	N0446S
Deoxynucleotide (dNTP) Solution Mix	The Deoxynucleotide Solution Mix is an equimolar mixture of ultrapure dATP, dCTP, dGTP, and dTTP. Each nucleotide is present at a concentration of 10 mM in the mixture for a total dNTP concentration of 40 mM.	N0447S/L
7-deaza-dGTP*	A useful additive for PCR of GC-rich templates; contains a 5 mM solution of 7-deaza-GTP as a dilithium salt. **licensed from Roche Diagnostics GmbH*	N0445S/L
Acyclonucleotide Set	Acyclonucleotide Set contains four separate tubes of acyNTPs (acyATP, acyCTP, acyGTP and acyTTP).	N0460S
dATP Solution	Contains 0.25 ml of 100 mM ultrapure dATP.	N0440S
Ribonucleotide Solution Set	Ribonucleotide Solution Set consists of four separate 100 mM solutions of ATP, GTP, CTP and UTP.	N0450S/L
Ribonucleotide Solution Mix	The Ribonucleotide Solution Mix is an equimolar mixture of ribonucleotide triphosphates (rATP, rCTP, rGTP and rUTP). Each is supplied at a concentration of 80 mM for a total concentration of 320 mM.	N0466S/L

DNA Analysis

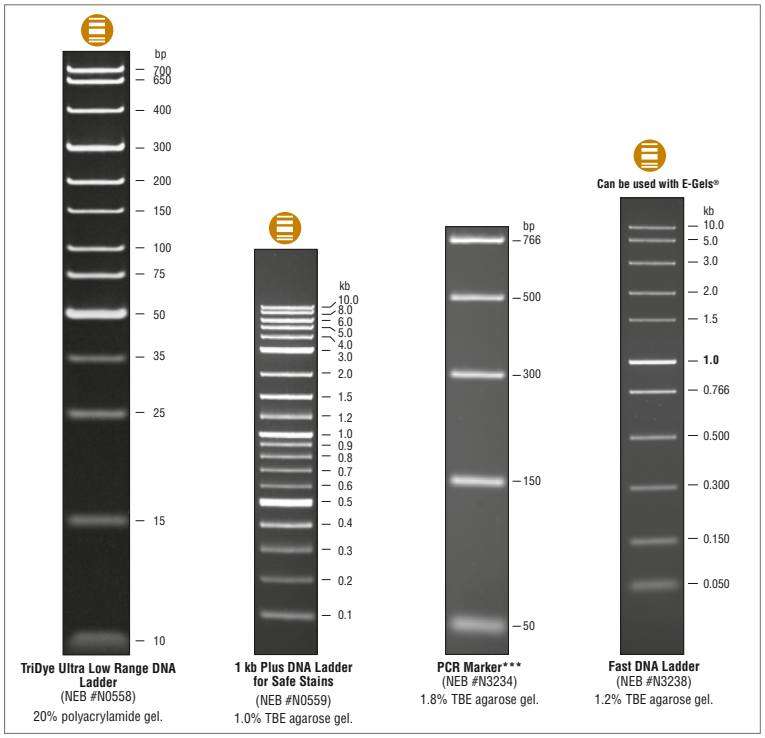
Agarose-gel electrophoresis is the standard method used for separation, identification and purification of DNA fragments. DNA is visualized on a gel after soaking or pre-casting the gel with a visualization dye, such as Ethidium Bromide, which is a DNA intercalating agent that fluoresces under UV illumination. DNA markers and ladders are composed of DNA fragments of known sizes and masses which are used as a reference to determine the size and relative mass of the DNA of interest. Bands are visible under UV illumination or under blue light illumination, depending on the visualization dye used. DNA markers and DNA samples have to be combined with loading dyes to give them density in the wells and to track the migration on the gel; some of NEB's ladders come pre-mixed with loading dye for convenience.

Quick-Load and Quick-Load Purple DNA Ladders

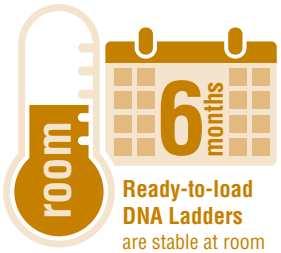


** Available in Quick-Load® and TriDye™ formats* *Ready-to-Load* **** Free Loading Dye included*

Additional DNA Ladders from NEB



- Sharp, crisp bands
- Excellent quality and value
- Convenient 1 kb Plus DNA Ladder available in a variety of formats, including one specifically optimized for safe stains (e.g., GelRed® and SYBR® Safe)
- TriDye Ultra Low Range DNA Ladder ranges as low as 10 bp and is suitable for polyacrylamide gels
- For help with choosing a ladder, visit **www.neb.com/DNAmarkersandladders**



Ready-to-load DNA Ladders are stable at room temp. for 6 months

Why is Polymerase Fidelity Important?

What is fidelity?

The fidelity of a DNA polymerase refers to its ability to accurately replicate a template. A critical aspect of this is the ability of the DNA polymerase to read a template strand, select the appropriate nucleoside triphosphate and insert the correct nucleotide at the 3′ primer terminus, such that canonical Watson-Crick base pairing is maintained. The rate of misincorporation is known as the polymerase's error rate. In addition to effective discrimination for correct over incorrect nucleotide incorporation, some DNA polymerases possess a 3′→5′ exonuclease activity. This activity, also termed proofreading, is used to excise incorrectly incorporated mononucleotides that are then replaced with the correct nucleotide. High-fidelity PCR utilizes DNA polymerases that couple low misincorporation rates with proofreading activity to give faithful replication of the DNA target of interest.

For what applications is fidelity important?

Fidelity is important for applications in which the DNA sequence must be correct after amplification, including:

- Cloning/subcloning from *in vitro* amplified material (PCR, WGA, etc) for protein expression or gene studies
- SNP analysis by cloning and sequencing
- RNA analysis by RT-PCR
- Applications that involve sequencing of *in vitro* amplified material

Fidelity is less important if the PCR amplified product is directly sequenced by Sanger sequencing (without an intervening cloning step), where the signal is an average of the input amplicons. Fidelity is also less important for diagnostic applications in which sequencing is not required after amplification, and the read-out is the presence or absence of a product. It is more important for next generation and single molecule sequencing techniques.

How does a high-fidelity polymerase ensure that the correct base is inserted?

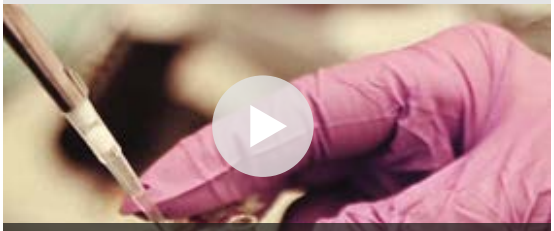
High-fidelity DNA polymerases have several checkpoints to protect against making and propagating mistakes while copying DNA.

- High-fidelity polymerases have a significant binding preference for the correct versus the incorrect nucleotide triphosphate during polymerization.
- If an incorrect nucleotide does bind in the polymerase active site, incorporation is slowed due to the sub-optimal architecture of the active site complex. This time increases the opportunity for the incorrect nucleotide to dissociate before incorporation, thereby allowing the process to start again (and for a correct nucleotide triphosphate to bind) (1,2).
- If an incorrect nucleotide is inserted, proofreading DNA polymerases have an extra line of defense. They can "sense" the perturbation caused by the mispaired bases and move the 3′ end of the growing DNA chain into a proofreading 3′→5′ exonuclease domain. There, the incorrect nucleotide is removed by the 3′→5′ exonuclease activity before the chain is moved back into the polymerase domain, where polymerization can continue with the correct nucleotide.

TOOLS & RESOURCES

Visit **www.neb.com/tools-and-resources/tutorials** to find the latest PCR videos from NEB Scientists, including:

- Choosing the right polymerase for your PCR
- How to amplify GC-rich DNA
- Why choose Q5 High-Fidelity DNA Polymerase
- Important tips for Q5 High-Fidelity DNA Polymerase
- Tips for amplifying large amplicons
- Amplification of GC-rich regions
- Tips for setting up PCR
- Types of PCR
- Why is Tm important?



IMPORTANT TIPS FOR Q5 HIGH-FIDELITY DNA POLYMERASE

FEATURED NEB PUBLICATION

Learn how PacBio sequencing was used to better understand sources of error introduced by PCR

Potapov, V. and Ong, J.L. (2017)*PLOS One*, 12(1): e 0169774

References:
1. Johnson, K. A. (2010) *Biochim. et. Biophys. Acta*, 1804, 1041–1048.
2. Joyce, C. M. and Bencovic, S. (2004) *Biochemistry*, 43, 14317–14324.

General Guidelines for PCR Optimization

New England Biolabs offers a diverse group of DNA Polymerases for PCR-based applications. Specific recommendations for PCR optimization can be found in the product literature or on the individual product webpages. However, these general guidelines will help to ensure success using New England Biolabs' PCR enzymes.

Setup Guidelines

DNA Template

- Use high quality, purified DNA templates whenever possible. Please refer to specific product information for amplification from unpurified DNA (e.g., colony PCR or direct PCR).
- For low complexity templates (e.g., plasmid, lambda, BAC DNA), use 1 pg–10 ng of DNA per 50 µl reaction
- For higher complexity templates (e.g., genomic DNA), use 1 ng–1 µg of DNA per 50 µl reaction
- Higher DNA concentrations tend to decrease amplicon specificity, particularly for high numbers of cycles

Primers

- Primers should typically be 20–30 nucleotides in length, with 40–60% GC Content
- Primer Tm values should be determined with NEB's Tm Calculator (TmCalculator.neb.com)
- Primer pairs should have Tm values that are within 5°C
- Avoid secondary structure (e.g., hairpins) within each primer and potential dimerization between the primers
- Higher than recommended primer concentrations may decrease specificity
- When engineering restriction sites onto the end of primers, 6 nucleotides should be added 5′ to the site
- Annealing temperatures should be determined according to specific enzyme recommendations. Please note that Q5 and Phusion* annealing temperature recommendations are unique.
- Final concentration of each primer should be 0.05–1 µM in the reaction. Please refer to the more detailed recommendations for each specific enzyme.
- When amplifying products > 20 kb in size, primers should be ≥ 24 nucleotides in length with a GC content above 50% and matched Tm values above 60°C
- To help eliminate primer degradation and subsequent non-specific product formation, use a hot-start enzyme (e.g., One*Taq* Hot Start DNA Polymerase or Q5 Hot Start High-Fidelity DNA Polymerase)

Magnesium Concentration

- Optimal Mg^{2+} concentration is usually 1.5–2.0 mM for most PCR polymerases
- Most PCR buffers provided by NEB already contain sufficient levels of Mg^{2+} at 1X concentrations.
- NEB offers a variety of Mg-free reaction buffers to which supplemental Mg^{2+} can be added for applications that require complete control over Mg^{2+} concentration
- Further optimization of Mg^{2+} concentration can be done in 0.2–1 mM increments, if necessary. For some specific applications, the enzyme may require as much as 6 mM Mg^{2+} in the reaction.
- Excess Mg^{2+} may lead to spurious amplification; Insufficient Mg^{2+} concentrations may cause reaction failure

Deoxynucleotides

- Ideal dNTP concentration is typically 200 µM of each, however, some enzymes may require as much as 400 µM each. Please refer to specific product literature for more detailed recommendations.
- Excess dNTPs can chelate Mg^{2+} and inhibit the polymerase
- Lower dNTP concentration can increase fidelity, however, yield is often reduced
- The presence of uracil in the primer, template, or deoxynucleotide mix will cause reaction failure when using archaeal PCR polymerases. Use One*Taq* or *Taq* DNA Polymerases for these applications.

Enzyme Concentration

- Optimal enzyme concentration in the reaction is specific to each polymerase. Please see the product literature for specific recommendations.
- In general, excess enzyme can lead to amplification failure, particularly when amplifying longer fragments

Starting Reactions

- Unless using a hot start enzyme (e.g., One*Taq* Hot Start DNA Polymerase or Q5 Hot Start High-Fidelity DNA Polymerase), assemble all reaction components on ice
- Add the polymerase last, whenever possible
- Transfer reactions to a thermocycler that has been pre-heated to the denaturation temperature. Please note that pre-heating the thermocycler is not necessary when using a hot start enzyme (e.g., One*Taq* Hot Start DNA Polymerase or Q5 Hot Start High-Fidelity DNA Polymerase).

Cycling Guidelines

Denaturation

- Optimal denaturation temperature ranges from 94°–98°C and is specific to the polymerase in the reaction. Please refer to product information for recommended conditions.
- Avoid longer or higher temperature incubations unless required due to high GC content of the template
- For most PCR polymerases, denaturation of 5–30 seconds is recommended during cycling
- NEB's aptamer-based hot start enzymes do not require additional denaturation steps to activate the enzymes

Annealing

- Primer Tm values should be determined using the NEB Tm Calculator (TmCalculator.neb.com)
- For PCR polymerases other than Q5 High-Fidelity DNA Polymerase or Phusion High-Fidelity DNA Polymerase*, annealing temperatures are usually set at 2°–5°C below the lowest Tm of the primer pair
- When using Q5 High-Fidelity DNA Polymerase or Phusion High-Fidelity DNA Polymerase*, annealing temperatures should be set at 0°–3°C above the lowest Tm of the primer pair. Please refer to the product literature for detailed recommendations.
- Non-specific product formation can often be avoided by optimizing the annealing temperature or by switching to a hot start enzyme (e.g., One*Taq* Hot Start DNA Polymerase or Q5 Hot Start High-Fidelity DNA Polymerase)
- Annealing temperatures can be optimized by doing a temperature gradient PCR, starting at 5°C below the lowest Tm of the primer pair
- Ideally, primer Tm values should be less than the extension temperature. However, if Tm values are calculated to be greater than the extension temperature, a two-step PCR program (combining annealing and extension into one step) can be employed.

Extension

- Extension temperature recommendations range from 65°–72°C and are specific to each PCR polymerase. Please refer to the product literature for specific recommendations.
- Extension rates are specific to each PCR polymerase. In general, extension rates range from 15–60 seconds per kb. Please refer to the recommendations for each specific product.
- Longer than recommended extension times can result in higher error rates, spurious banding patterns and/or reduction of amplicon yields

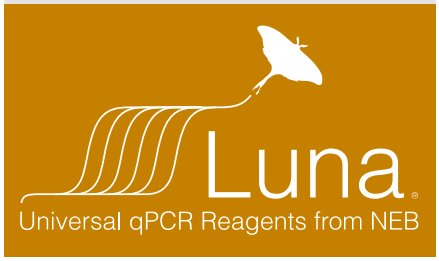
*Phusion DNA Polymerase was developed by Finnzymes Oy, now a part of Thermo Fisher Scientific. This product is manufactured by New England Biolabs, Inc. under agreement with, and under the performance specifications of Thermo Fisher Scientific. Phusion® is a registered trademark and property of Thermo Fisher Scientific.

For more information on polymerase properties and usage, visit www.neb.com.

qPCR & RT-qPCR GUIDELINES

Are you doing qPCR or RT-qPCR?

Visit **www.neb.com/qPCRguidelines or www.neb.com/RTqPCRguidelines** for optimization tips when using Luna qPCR & RT-qPCR products.



PCR Polymerases

PRODUCT	NEB #	SIZE
Deep Vent DNA Polymerase	M0258S/L	200/1,000 units
Deep Vent (exo⁻) DNA Polymerase	M0259S/L	200/1,000 units
EpiMark Hot Start *Taq* DNA Polymerase	M0490S/L	100/500 reactions
Hemo KlenTaq DNA Polymerase	M0332S/L	200/1,000 reactions (25 µl reaction vol)
Hot Start *Taq* 2X Master Mix	M0496S/L	100/500 reactions (50 µl reaction vol)
Hot Start *Taq* DNA Polymerase	M0495S/L	200/1,000 units
LongAmp *Taq* 2X Master Mix	M0287S/L	100/500 reactions (50 µl reaction vol)
LongAmp *Taq* DNA Polymerase	M0323S/L	500/2,500 units
LongAmp *Taq* PCR Kit	E5200S	100 reactions (50 µl reaction vol)
LongAmp Hot Start *Taq* DNA Polymerase	M0534S/L	500/2,500 units
LongAmp Hot Start *Taq* 2X Master Mix	M0533S/L	100/500 reactions (50 µl reaction vol)
Multiplex PCR 5X Master Mix	M0284S	100 reactions (50 µl reaction vol)
NEBNext High-Fidelity 2X PCR Master Mix	M0541S/L	50/250 reactions
NEBNext Ultra II Q5 Master Mix	M0544S/L	50/250 reactions
One*Taq* DNA Polymerase	M0480S/L/X	200/1,000/5,000 units
One*Taq* 2X Master Mix with Standard Buffer	M0482S/L	100/500 reactions (50 µl reaction vol)
One*Taq* Quick-Load 2X Master Mix with Standard Buffer	M0486S/L	100/500 reactions (50 µl reaction vol)
One*Taq* Hot Start DNA Polymerase	M0481S/L/X	200/1,000/5,000 units
One*Taq* Hot Start 2X Master Mix with Standard Buffer	M0484S/L	100/500 reactions (50 µl reaction vol)
One*Taq* Hot Start 2X Master Mix with GC Buffer	M0485S/L	100/500 reactions (50 µl reaction vol)
One*Taq* Hot Start Quick-Load 2X Master Mix with Standard Buffer	M0488S/L	100/500 reactions (50 µl reaction vol)
One*Taq* Hot Start Quick-Load 2X Master Mix with GC Buffer	M0489S/L	100/500 reactions (50 µl reaction vol)
One*Taq* Quick-Load DNA Polymerase	M0509S/L/X	100/500/2,500 units
Phusion High-Fidelity DNA Polymerase	M0530S/L	100/500 units
Phusion High-Fidelity PCR Kit	E0553S/L	50/200 reactions (50 µl reaction vol)
Phusion High-Fidelity PCR Master Mix with HF Buffer	M0531S/L	100/500 reactions (50 µl reaction vol)
Phusion High-Fidelity PCR Master Mix with GC Buffer	M0532S/L	100/500 reactions (50 µl reaction vol)
Phusion Hot Start Flex DNA Polymerase	M0535S/L	100/500 units
Phusion Hot Start Flex 2X Master Mix	M0536S/L	100/500 reactions (50 µl reaction vol)
Q5 High-Fidelity DNA Polymerase	M0491S/L	100/500 units
Q5 Hot Start High-Fidelity DNA Polymerase	M0493S/L	100/500 units
Q5 High-Fidelity 2X Master Mix	M0492S/L	100/500 reactions (50 µl reaction vol)
Q5 Hot Start High-Fidelity 2X Master Mix	M0494S/L/X	100/500/500 reactions (50 µl reaction vol)
Q5U Hot Start High-Fidelity DNA Polymerase	M0515S/L	100/500 units
NEBNext Q5U Master Mix	M0597S/L	50/250 reactions
Quick-Load *Taq* 2X Master Mix	M0271L	500 reactions (50 µl reaction vol)
Taq 2X Master Mix	M0270L	500 reactions (50 µl reaction vol)
Taq 5X Master Mix	M0285L	500 reactions (50 µl reaction vol)
Taq DNA Polymerase with Standard *Taq* Buffer	M0273S/L/X/E	400/2,000/4,000/20,000 units
Taq DNA Polymerase with Standard *Taq* (Mg-free) Buffer	M0320S/L	400/2,000 units
Taq DNA Polymerase with ThermoPol Buffer	M0267S/L/X/E	400/2,000/4,000/20,000 units
Taq PCR Kit	E5000S	200 reactions (50 µl reaction vol)
Vent DNA Polymerase	M0254S/L	200/1,000 units
Vent (exo⁻) DNA Polymerase	M0257S/L	200/1,000 units

Repair

PRODUCT	NEB #	SIZE
PreCR Repair Mix	M0309S/L	30/150 reactions
NEBNext FFPE DNA Repair Mix	M6630S/L	24/96 reactions

Visit LUNAqPCR.com for ordering and sample information for Luna qPCR and RT-qPCR products.

Companion Products

PRODUCT	NEB #	SIZE
1 kb DNA Ladder	N3232S/L	200/1,000 gel lanes
Quick-Load 1 kb Extend DNA Ladder	N3239S	125 gel lanes
100 bp DNA Ladder	N3231S/L	100/500 gel lanes
1 kb Plus DNA Ladder	N3200S/L	100–200/500–1,000 gel lanes
50 bp DNA Ladder	N3236S/L	100–200/500–1,000 gel lanes
Low Molecular Weight DNA Ladder	N3233S/L	100/500 gel lanes
Fast DNA Ladder	N3238S	50 gel lanes
PCR Marker	N3234S/L	100/500 gel lanes
Quick-Load Purple 1 kb DNA Ladder	N0552S/L	125/375 gel lanes
Quick-Load Purple 50 bp DNA Ladder	N0556S	250 gel lanes
Quick-Load Purple 100 bp DNA Ladder	N0551S/L	125/375 gel lanes
Quick-Load Purple 1 kb Plus DNA Ladder	N0550S/L	125–250/375–750 gel lanes
Quick-Load Purple Low Molecular Weight DNA Ladder	N0557S	125 gel lanes
Deoxynucleotide Solution Set	N0446S	25 µmol of each
Deoxynucleotide Solution Mix	N0447S/L	8 µmol of each/40 µmol of each
dATP Solution	N0440S	25 µmol
Acyclonucleotide Set	N0460S	0.5 µmol of each
7-deaza-dGTP	N0445S/L	0.15 µmol of each/0.3 µmol of each
Ribonucleotide Solution Set	N0450S/L	10 µmol of each/50 µmol of each
Ribonucleotide Solution Mix	N0466S/L	8 µmol of each/40 µmol of each
Monarch® Plasmid Miniprep Kit	T1010S/L	50/250 preps
Monarch DNA Gel Extraction Kit	T1020S/L	50/250 preps
Monarch PCR & DNA Cleanup Kit (5 µg)	T1030S/L	50/250 preps
Exo-CIP™ Rapid PCR Cleanup Kit	E1050S/L	100/400 reactions

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ISO 13485 Registered Medical Devices
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Featured Tools

Use this tool to help select the right DNA polymerase for your PCR setup.

Determine the optimal annealing temperature for your amplicon with our **Tm Calculator**.

Download the **NEB AR App** for iPhone® or iPad®. Scan the augmented reality butterfly icon located on the corner of the page to find videos, tutorials and immersive experiences.

PCR Version 12.0 - 09/21
x/f/yNEB105

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