Tools for DNA cloning

A range of products from restriction enzymes to custom gene synthesis

We've provided high-quality tools for DNA cloning for 30 years, continually improving existing technologies and developing new ones.

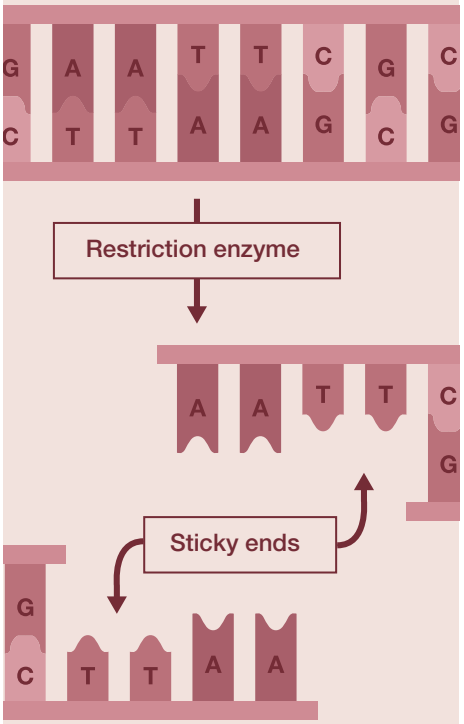
Our simple yet powerful portfolio of cloning products and our customized gene synthesis service offer comprehensive solutions—from restriction enzymes to fully cloned genes—to help you save time and money while obtaining high-quality DNA to facilitate your next discovery.

For Research Use Only. Not for use in diagnostic procedures.

Methods used for DNA cloning

Thermo Scientific™ FastDigest™ restriction enzymes

- Convenient single-buffer system of 176 restriction enzymes and 8 modifying enzymes
- Excellent for subcloning
- Single or multiple digestion in 5–15 min and no star activity
- Direct loading of reaction mixture on gels



thermofisher.com/fastdigest
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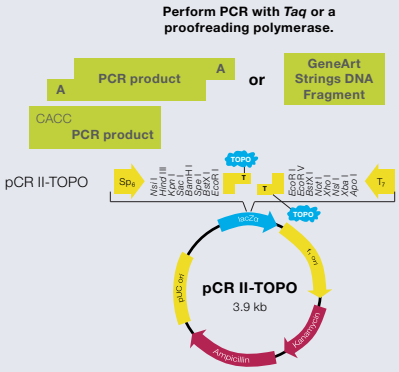
Invitrogen™ TOPO™ cloning technology

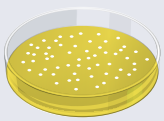
- Excellent choice for subcloning and sequencing of PCR or other DNA fragments
- Up to 95% efficiency and fast 5 min reactions
- Expression and Gateway entry formats also available
- Vectors come bound with DNA topoisomerase I, which functions as a ligase



1. Add 1 µL of PCR product to 1 µL of TOPO cloning vector.

2. Incubate 5 min at room temperature.

3. Transform with competent cells.



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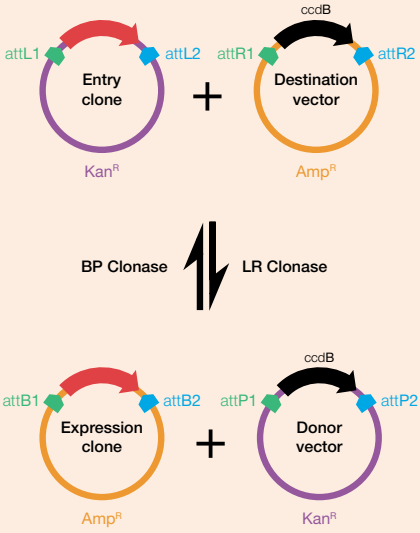
Invitrogen™ Gateway™ cloning technology

- Flexible system for shuttling between various protein expression systems, such as mammalian and bacterial
- No need to reclone or resequence DNA
- Uses site-specific recombination technology



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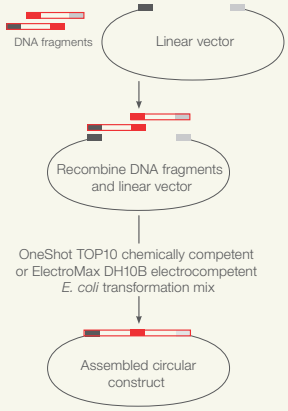
Invitrogen™ GeneArt™ Gibson Assembly™ technology

- Homologous overlap design to clone anywhere from 1 to 15 fragments without scars
- Choice of Invitrogen™ GeneArt™ Gibson Assembly™ HiFi or EX cloning kits for simple to highly complex cloning
- Available as full cloning kits with chemically and electrocompetent cells or master mix formats for maximum flexibility
- Can be used to build entire genomes *de novo*



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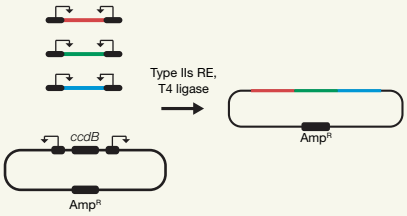
Invitrogen™ GeneArt™ Type IIs Assembly Kits

- Directionally clone up to 8 fragments at a time
- Great for cloning repetitive or small inserts
- Uses simultaneous cleavage and ligation; not based on recombination



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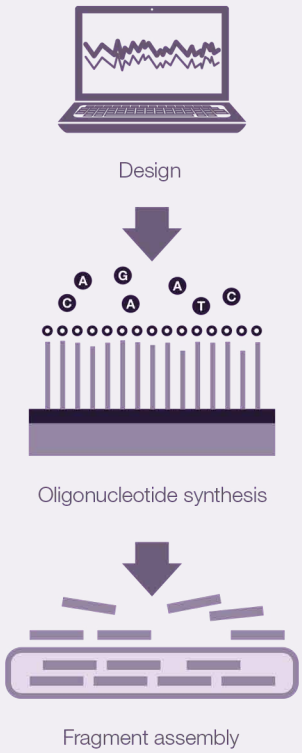
Invitrogen™ GeneArt™ Strings™ DNA Fragments

- Synthetic double-stranded DNA fragments, ready to clone
- Specify ends to facilitate cloning method of choice
- No template DNA required
- Free optimization of sequence with Invitrogen™ GeneOptimizer™ software for maximum protein expression
- Libraries with full IUPAC code of mixed, randomized DNA nucleotide options also available



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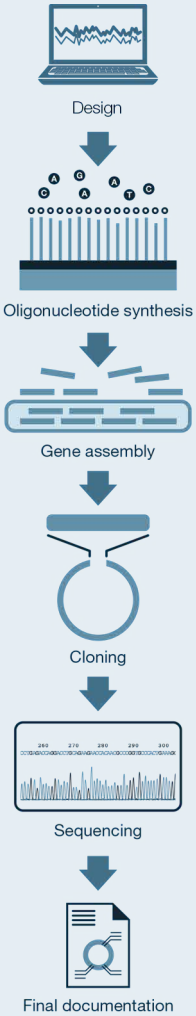
Invitrogen™ GeneArt™ Gene Synthesis

- Synthetic gene, ready to transfect
- Choose from popular vectors or onboard your own custom vector
- 100% sequence-verified and ready for downstream applications
- No template DNA required
- Free optimization of gene with GeneOptimizer software for maximum protein expression



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Cloning solutions comparison

	FastDigest restriction enzymes	TOPO technology/ TA cloning kits	Gateway cloning system	GeneArt Gibson Assembly cloning and Type IIs assembly kits	GeneArt Strings DNA Fragments and Gene Synthesis
Needs DNA source material (plasmid with gene, library, etc.)	Yes	Yes	Yes	Yes	No
Requires knowledge of sequence	Some	Some	Some	Some	Yes
Sequence optimization and/or easy mutagenesis	No	No	No	Yes	Yes
Requires vector	Yes	Yes	Yes	Yes	Strings DNA Fragments: Yes Gene Synthesis: No
Online tools available	FastDigest selection tool	TOPO PCR selection tool	Vector selection tool	Invitrogen™ GeneArt™ Primer and Construct Design Tool	Invitrogen™ GeneArt™ Instant Designer Tool for design and optimization
Simplified traditional cloning	**Best choice**				
Fast and reliable PCR product or DNA fragment cloning		**Best choice**			
Shuttle between a variety of host vector systems			**Best choice**		
Easy assembly of multiple DNA fragments				**Best choice**	
Optimized sequence, easy mutation, and 100% sequence-verified					**Best choice**
Recommended additional materials	• Ligation enzymes • Cleanup kit • Competent cells • Purification kit • Invitrogen™ E-Gel™ precast gels • DNA markers/ ladders	• Competent cells • Purification kit • GeneArt Strings DNA Fragments • E-Gel precast gels • DNA markers/ ladders	• Gateway cloning kit with competent cells • Invitrogen™ Gateway™ BP Clonase™ and LR Clonase™ enzymes • Purification kit • E-Gel precast gels • DNA markers/ ladders	• PCR cloning kit with competent cells or GeneArt Strings DNA Fragments • Purification kit • E-Gel precast gels • DNA markers/ladders	• Subcloning and plasmid prep services • Mutagenesis or gene variants • Libraries
The bottom line	• Classical cloning method (most widely used) • Simple cloning and subcloning (difficult to clone several fragments simultaneously)	• Good for cloning PCR products and GeneArt Strings DNA Fragments • Fastest cloning technique	• Good for protein expression in multiple systems, such as bacterial and mammalian • Used especially in genetic engineering of plants	• Good for simultaneous, multi-fragment cloning • Assembly of large fragments • Golden Gate cloning used to create CRISPR-Cas9 constructs	• Get your gene of interest ready to use • Focus on your research while we take care of the cloning

Find out more at **thermofisher.com/cloning**