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answers that go further

GlobalFiler PCR amplification kits

ThermoFisher SCIENTIFIC

GlobalFiler, GlobalFiler IQC, and GlobalFiler Express kits

Around the world, forensic DNA labs are being asked to do more with less. Applied Biosystems™ GlobalFiler™, GlobalFiler™ IQC, and GlobalFiler™ Express PCR Amplification Kits combine reduced amplification time with exceptional discrimination power, enabling forensic researchers to maximize information recovery, even on the most challenging casework sample types.

As global forensic DNA databases rapidly expand, so does the need for more discriminating short tandem repeat (STR) multiplexes that can maximize loci overlap. GlobalFiler kits can meet this need, since they incorporate the most commonly used loci—all in a single multiplex, 6-dye configuration kit. GlobalFiler kits contain all markers recommended for inclusion by the Combined DNA Index System (CODIS) Core Loci Working Group and those commonly used in Europe. Use of the recommended markers in multiplex kits reduces the risk of adventitious matches while enabling more effective cross-border data sharing. Additionally, the kits are backed by training, service, and support from Thermo Fisher Scientific.

One of the GlobalFiler kits is also available with an internal quality control system, or IQC, as part of a fully integrated and verified forensic workflow. The IQC system comprises two synthetic sequences with specific primers for each of the targets (IQC Small (IQCS) and IQC Large (IQCL)) and provides positive confirmation of sample amplification. It also indicates adverse conditions that may compromise amplification, such as the presence of PCR inhibitors. The IQC system, also used in Applied Biosystems™ VeriFiler Plus™ and NGM Detect™ kits, provides additional confidence in genotyping results, and can help users distinguish, for example, between inhibited and degraded DNA samples.

Discriminating marker selection

- 24-locus multiplex assay that contains all CODIS markers, European standard set (ESS) markers, and SE33
- 3 gender discrimination markers for maximum confidence

Optimized for challenging samples

- Includes 10 powerful mini-STR loci (<220 bp) for increased information recovery from heavily degraded samples
- Enhanced buffer system enables superior performance on samples containing inhibitors
- Expanded sensitivity and the flexibility to add up to 15 µL of sample enable increased allele recovery from low-level DNA samples

Outstanding operational efficiency

- Improved data interpretation with reduced pull-up edits (Figure 1) and off-scale data recovery when combined with Applied Biosystems™ 3500 Data Collection Software v4.0 and Applied Biosystems™ GeneMapper™ *ID-X* Software v1.6
- IQC system for sample quality assessment (in GlobalFiler IQC kit only)

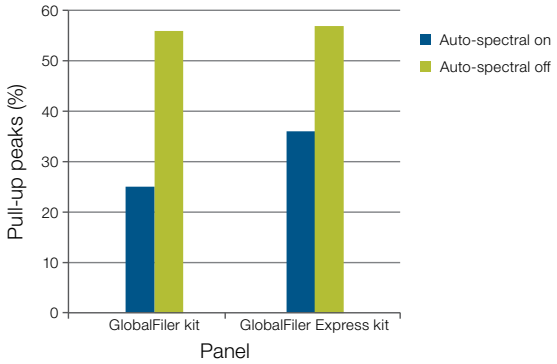


Figure 1. Pull-up peak reduction results. Samples were analyzed at 1 ng and 2 ng gDNA input using GlobalFiler STR kits on the Applied Biosystems™ 3500 Genetic Analyzer with Data Collection Software v4.0 and GeneMapper *ID-X* Software v1.6. Each kit demonstrated a reduction of >35% in the number of peaks with a pull-up edit required when using the auto-spectral algorithm.

Key features of the GlobalFiler kits

		GlobalFiler kit	GlobalFiler IQC kit	GlobalFiler Express kit
Kit composition	High discrimination power	24-marker multiplex assay including 3 gender markers and the highly discriminatory SE33 locus		
	Number of dyes	6		
	Mini-STR (<220 bp)	10		
	Gender markers	Y-indel, amelogenin, and DYS391		
	IQC markers	No	Yes: for distinguishing inhibited and degraded samples; positive control for PCR amplification	No
	Identical primer sequences	✓	✓ (except for the IQC)	✓
	Probability of identity (PI) value	African American: 6.18×10^{-27}		
		US Caucasian: 3.71×10^{-26}		
		US Hispanic: 3.09×10^{-26}		
		Asian: 3.24×10^{-24}		
Database compatibility	Required ESS markers	✓	✓	✓
	Required CODIS markers	✓	✓	✓
	NDIS* approved	✓	In progress	✓
Kit protocols	DNA input	15 µL/1 ng target		Treated or untreated paper: 1.2 mm punch Swab: 3 µL (of 400 µL) Applied Biosystems™ Prep-n-Go™ Buffer
	Final PCR volume	25 µL		15 µL
	Technical note supporting direct amplification	✓	No	✓
	Supported sample types	Optimized chemistry for challenging sample types: touched, inhibited, or degraded samples		Verified with multiple sample collection devices such as treated paper, untreated paper, and swabs; designed to work with the most commonly used substrates

* NDIS: US National DNA Index System.

The GlobalFiler PCR Amplification Kit is the first 6-dye, 24-locus STR kit that combines maximum compatibility with global databasing loci standards. With dramatically reduced amplification time and superior discrimination power, it helps enable forensic DNA labs worldwide to maximize information recovery and improve overall efficiency (Figure 2). Although optimized for casework samples, direct amplification of single-source reference samples using the GlobalFiler kit is also supported to enable laboratories to process all sample types with one amplification kit. In addition, laboratories have implemented a 30-cycle protocol using the GlobalFiler kit to increase allele recovery from bone samples (Figure 3).

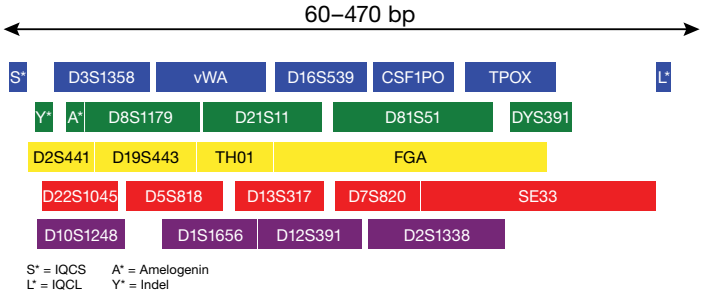


Figure 2. Multiplex configuration of the GlobalFiler kit. The kit includes all 24 loci with only 1 locus partially exceeding 400 base pairs. 10 mini-STR loci lie completely below 220 base pairs, and all gender-specific markers are located in the green VIC™ dye channel for convenience of interpretation. The IQCS and IQCL markers are only present in the GlobalFiler IQC kit.

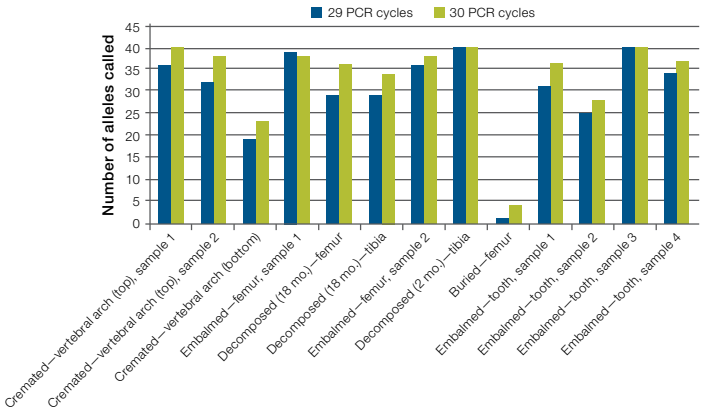
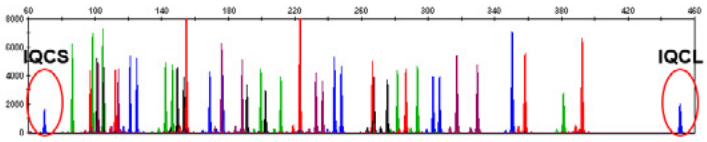
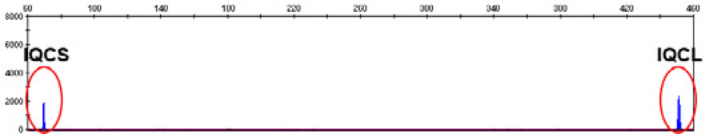


Figure 3. A comparison of the mean number of alleles (excluding amelogenin) called across sample types when amplified at 29 and 30 cycles. Samples were prepared using the Applied Biosystems™ PrepFiler™ BTA DNA Extraction Kit.

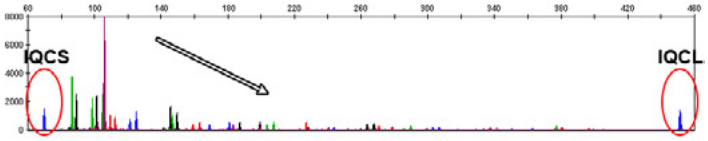
The GlobalFiler IQC PCR Amplification Kit includes the same PCR primers as the original GlobalFiler kit and uses the same PCR setup, thermal cycling, and electrophoresis conditions. Additionally, it contains the IQC system, which is particularly useful to confirm the validity of negative results and can also be used to distinguish between samples that are degraded and those that contain PCR inhibitors (Figure 4). When the IQC system indicates degraded DNA, forensic analysts may reamplify a sample with a higher amount of input DNA or choose a complementary STR amplification kit that has an alternative marker set configuration to maximize information recovery. If the IQC system indicates inhibitors are present, the analyst may opt for an additional purification step or a dilution of the original sample before repeating sample amplification.



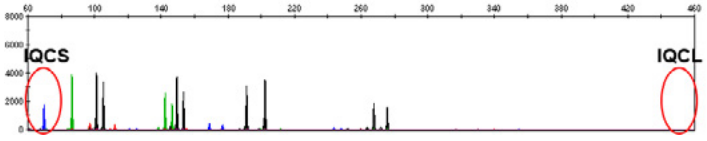
IQC peaks are present and balanced, full profile
Conclusion—normal sample



Only IQC peaks are present and balanced
Conclusion—valid negative



IQC peaks are present and balanced, partial profile
Conclusion—degradation



Reduced IQCL peak height, partial profile
Conclusion—inhibition

Figure 4. Analysis of samples using the two quality markers, IQCS and IQCL, of the IQC system.

The GlobalFiler Express PCR Amplification Kit has been optimized to deliver high-quality results with a wide range of single-source DNA sample and substrate inputs. The introduction of simplified, fast amplification protocols has enabled workflow efficiency for single-source DNA samples. Untreated substrates such as swabs and papers utilize Prep-n-Go Buffer prior to amplification to facilitate lysis, enabling results similar to treated papers (Figures 5 and 6). Additional sample collection methods, such as the Bode™ Buccal DNA Collector™ device, have been tested (data not shown).

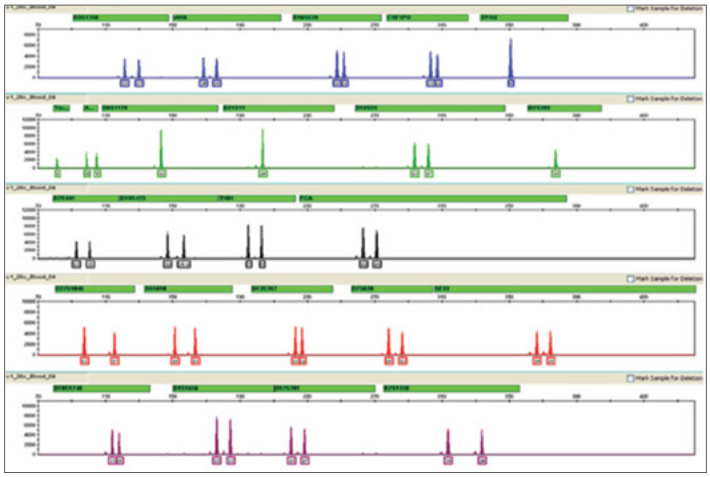


Figure 5. Direct amplification of a blood sample on Whatman™ FTA™ paper. Sample was punched directly into the GlobalFiler Express reaction mix.

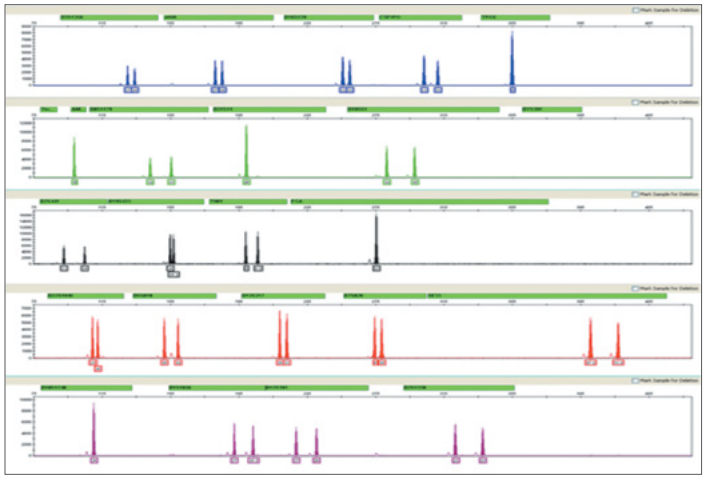


Figure 6. Direct amplification of cell lysate taken from a buccal sample on a Copan™ 4N6FLOQSwabs™ device, which was treated with Prep-N-Go Buffer.

The GlobalFiler and GlobalFiler Express kits are approved by the FBI's NDIS board for use by laboratories generating DNA profiles of offenders for inclusion in the U.S. National NDIS database.

NDIS approved

GlobalFiler kits are manufactured at our location in Warrington, United Kingdom, a facility that meets the guidelines for ISO 18385 certification. We have made significant investments across all aspects of production to minimize human DNA contamination. The result is powerful forensic DNA–grade solutions that enable you to provide answers with certainty and confidence.

ISO 18385 Forensic DNA Grade

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Ordering information

Product	Quantity	Cat. No.
GlobalFiler IQC PCR Amplification Kit	200 reactions	A43565
GlobalFiler PCR Amplification Kit	200 reactions	4476135
	1,000 reactions	4482815
GlobalFiler Express PCR Amplification Kit	200 reactions	4476609
	1,000 reactions	4474665
GlobalFiler Express PCR Amplification Kit and Prep-n-Go Buffer (for buccal swabs)	200 reactions	4479649
	1,000 reactions	4479648
DS-36 Matrix Standard (Dye Set J6)	8 runs	4425042
GeneScan 600 LIZ Dye Size Standard v2.0	800 reactions	4408399
Hi-Di Formamide	4 tubes, 5 mL each	4440753
GeneMapper *ID-X* Software v1.6, full installation	1 license	A39975

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

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