

## **BBF RFC 29: Naming of standards of physical composition of BioBrick parts**

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### **1 Purpose**

This BioBricks Foundation Request for Comments (BBF RFC) proposes a naming convention for standards of physical composition of BioBrick parts in which assembly standards are named according to the BBF RFC that specifies the standard.

### **2 Relation to other BBF RFCs**

BBF RFC 29 does not update or replace any earlier BBF RFC.

### **3 Copyright Notice**

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### **4 Standard for Physical Composition**

Biological parts encode basic biological functions, such as promoters, ribosome binding sites, coding sequences and terminators, as nucleic acid sequences [1]. Standard biological parts are genetic parts that adhere to one or more technical specifications that prescribe, for example, part design, function, operation or testing [2]. In 2003, Tom Knight published a standard for physical composition of genetic parts [3]. The standard defined short nucleic acid sequences that should flank genetic parts and restriction enzyme recognition sites that should not occur within the genetic parts. The flanking sequences were designed to enable any part to be physically assembled with any other part, where the resulting object was again a genetic part in the same format.

## 5 Development of Additional Standards for Physical Composition

Although Tom Knight’s 2003 standard for physical composition has been widely used by the synthetic biology community, it does have some drawbacks. For example, the standard creates a “scar” sequence between adjacent parts. The length of the scar sequence, 8 base pairs, precludes the in-frame assembly of genetic parts that encode protein domains and tags [4]. To address this limitation and others, several new standards for physical composition have been developed by various groups [5]. Each of these standards for physical composition enables genetic parts to be assembled together readily; thus, standards for physical composition are also commonly referred to as assembly standards, and the two names can be used interchangeably.

## 6 Current Naming Conventions for Standards of Physical Composition

To date, the different proposed standards of physical composition have generally been named by the authors of each respective standard (Table 1). Such an approach is in keeping with common practice in molecular biology in which plasmids and synthetic genetic components are named by the creator. However, this approach can lead to situations in which one standard has multiple names or in which it is not clear to which standard a name refers. The confusion becomes problematic primarily when attempting to capture information regarding different standards in a computer-readable format. The problem of ambiguous naming conventions is not unique to synthetic biology: gene and enzyme names have similar issues. In such cases, the community has relied on the use of identifying codes or numbers to refer to specific objects (e.g., PDB codes, accession numbers, etc.).

## 7 Proposed Naming Convention for Standards of Physical Composition

Standards of physical composition **MUST** be named according to the number of the BBF RFC that specifies the standard. The new names for each standard with a BBF RFC number are listed (Table 1). All current standards

<i>Current name(s)</i>	<i>Authors</i>	<i>Reference</i>	<i>New name</i>
BioBrick standard Assembly Standard 1	Tom Knight	[3]	Assembly standard 10
Silver standard BioFusion standard	Ira Phillips & Pamela Silver	[4]	Assembly standard 23
Berkeley standard BBb standard BamHI/BglII standard	J. Chris Anderson <i>et al.</i>	[5]	Assembly standard 21
Freiburg standard	Kristian Mueller <i>et al.</i>	[5]	Assembly standard 25
AarI cloning standard Lim standard	Sergio Peisajovich <i>et al.</i>	[6]	Assembly standard 28
BB-2 standard	Tom Knight	[7]	Assembly standard 12

Table 1: Proposed standards for physical composition (or assembly standards) in synthetic biology. Note that this table is not a comprehensive list.

MUST be documented as a BBF RFC, so that the standard can be encoded in computer-readable formats used by the Registry of Standard Biological Parts (<http://partsregistry.org>) and other synthetic biology CAD tools.

## 8 Future Work

We anticipate that standards for physical composition will change and improve over time and that the community will develop many more proposed standards for physical composition. In the future, it may be neither practical nor desirable for the Registry and other CAD tools to support every iteration of every physical composition standard specified in a BBF RFC. Therefore, it will likely become necessary for the community to develop a mechanism through which assembly standards can be finalized and selected for use by the community. However, given the relatively early stage of assembly standards development efforts, we believe that putting in place such a mechanism at this time may be premature. Currently, different organizations, labs, individuals and CAD tools are free to support whichever standard(s) they choose.

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