**Support Document**

*For “Fiat Surfaces in Basic Formal Ontology”*

Michael Rabenberg and Werner Ceusters

This document describes the test we conducted as support for the conclusion that *BFO-2020* is consistent with the conjunction of (i)–(iv) (the propositions relevant to (D2) presented in Section 3 of our paper “Fiat Surfaces in Basic Formal Ontology”):

(i) At some time, some fiat surface is not a proper continuant part of any fiat surface.

(ii) At some time, some fiat surface is a proper continuant part of some fiat surface.

(iii) At some time, there is a fiat surface with exactly one fiat surface among its proper continuant parts.

(iv) At some time, there is a fiat surface, s1, with a fiat surface for a proper continuant part, and for any fiat surface, s2, that is a proper continuant part of s1, there is a fiat surface, s3, such that s3 is a proper continuant part of s1 and s2 is a proper continuant part of s3.

We inputted nine propositions together (not individually) into our reasoner along with *BFO-2020*. *Our reasoner found no contradiction upon reasoning on the conjunction of the input propositions and BFO-2020*. Here are the input propositions (some are written in the syntax legible by our reasoner; others are written in CLIF):

t([0,instance-of,surface-1,fiat-surface,time-1]). *(That is, it is the case that surface-1 is an instance of fiat-surface at time-1.)*

t([0,instance-of,surface-2,fiat-surface,time-1]).

t([0,instance-of,surface-3,fiat-surface,time-1]).

t([0,instance-of,surface-4,fiat-surface,time-1]).

t([0,proper-continuant-part-of,surface-2,surface-1,time-1]).

t([0,proper-continuant-part-of,surface-4,surface-3,time-1]).

(cl:comment "surface-1 is not a proper continuant part of a fiat surface at time-1 [www1-1]"

(not (exists (a)

(and (instance-of a fiat-surface time-1)

(proper-continuant-part-of surface-1 a time-1)))))

(cl:comment "everything that is a fiat surface and a proper continuant part of surface-1 at time-1 is surface-2 [www1-2]"

(forall (x)

(if (and (instance-of x fiat-surface time-1)

(proper-continuant-part-of x surface-1 time-1))

(= x surface-2))))

(cl:comment "if surface-3 has a proper continuant part that is a fiat surface at time-1, then surface-3 is mereologically dense with fiat surfaces at time-1 [www1-3]"

(forall (a)

(if (and (instance-of a fiat-surface time-1)

(proper-continuant-part-of a surface-3 time-1))

(exists (b)

(and (instance-of b fiat-surface time-1)

(proper-continuant-part-of b surface-3 time-1)

(proper-continuant-part-of a b time-1))))))

The input propositions jointly entail (i)–(iv), for they jointly entail all of the following propositions:

1. At time-1, surface-1 is a fiat surface that is not a proper continuant part of a fiat surface.
2. At time-1, surface-2 is the only fiat surface that is a proper continuant part of surface-1 at time-1.
3. At time-1, surface-3 and surface-4 are fiat surfaces, surface-4 is a proper continuant part of surface-3, and for any fiat surface, s, that is a proper continuant part of surface-3, there is a fiat surface, ss, such that ss is a proper continuant part of surface-3 and surface-4 is a proper continuant part of ss.

And (A) entails (i), (A) and (B) jointly entail (ii) and (iii), and (C) entails (iv).

Because the input propositions entail (i)–(iv) and our reasoner found no contradiction upon reasoning over the conjunction of the input propositions and *BFO-2020*, we take our test to support the conclusion that *BFO-2020* is consistent with the conjunction of (i)–(iv).