

# Software Requirements Specification for HGHC

W. Spencer Smith

February 3, 2026

## Contents

<b>1</b>	<b>Reference Material</b>	<b>2</b>
1.1	Table of Units . . . . .	2
1.2	Table of Symbols . . . . .	2
<b>2</b>	<b>Introduction</b>	<b>2</b>
<b>3</b>	<b>Specific System Description</b>	<b>3</b>
3.1	Solution Characteristics Specification . . . . .	3
3.1.1	Theoretical Models . . . . .	3
3.1.2	General Definitions . . . . .	3
3.1.3	Data Definitions . . . . .	3
3.1.4	Instance Models . . . . .	5

# 1 Reference Material

This section records information for easy reference.

## 1.1 Table of Units

The unit system used throughout is SI (Système International d’Unités). In addition to the basic units, several derived units are also used. For each unit, the [Table of Units](#) lists the symbol, a description, and the SI name.

Table 1: Table of Units

Symbol	Description	SI Name
°C	temperature	centigrade
m	length	metre
W	power	watt

## 1.2 Table of Symbols

The symbols used in this document are summarized in the [Table of Symbols](#) along with their units. The choice of symbols was made to be consistent with the nuclear physics literature and with that used in the FP manual.

Table 2: Table of Symbols

Symbol	Description	Units
$h_b$	Initial coolant film conductance	—
$h_c$	Convective heat transfer coefficient between clad and coolant	$\frac{W}{m^2 \cdot ^\circ C}$
$h_g$	Effective heat transfer coefficient between clad and fuel surface	$\frac{W}{m^2 \cdot ^\circ C}$
$h_p$	Initial gap film conductance	—
$k_c$	Clad conductivity	—
$\tau_c$	Clad thickness	—

# 2 Introduction

Heat transfer through the cladding of a nuclear fuel element influences performance and safety. Engineers therefore rely on dependable calculations of the heat transfer coefficients used for simulating the temperature. This document describes the requirements of a program called HGHC.

The following section provides an overview of the software requirements specification (SRS) for HGHC. This section explains the purpose of this document.

## 3 Specific System Description

This section first presents the problem description, which gives a high-level view of the problem to be solved. This is followed by the solution characteristics specification, which presents the assumptions, theories, and definitions that are used.

### 3.1 Solution Characteristics Specification

The instance models that govern HGHC are presented in the [Instance Model Section](#). The information to understand the meaning of the instance models and their derivation is also presented, so that the instance models can be verified.

#### 3.1.1 Theoretical Models

There are no theoretical models.

#### 3.1.2 General Definitions

There are no general definitions.

#### 3.1.3 Data Definitions

This section collects and defines all the data needed to build the instance models.

<b>Refname</b>	<b>DD:htTransCladFuel</b>
Label	Effective heat transfer coefficient between clad and fuel surface
Symbol	$h_g$
Units	$\frac{W}{m^2 \cdot ^\circ C}$
Equation	$h_g = \frac{2 k_c h_p}{2 k_c + \tau_c h_p}$
Description	<p><math>h_g</math> is the effective heat transfer coefficient between clad and fuel surface  <math>(\frac{W}{m^2 \cdot ^\circ C})</math>  <math>k_c</math> is the clad conductivity (Unitless)  <math>h_p</math> is the initial gap film conductance (Unitless)  <math>\tau_c</math> is the clad thickness (Unitless)</p>
<b>Refname</b>	<b>DD:htTransCladCool</b>
Label	Convective heat transfer coefficient between clad and coolant
Symbol	$h_c$
Units	$\frac{W}{m^2 \cdot ^\circ C}$
Equation	$h_c = \frac{2 k_c h_b}{2 k_c + \tau_c h_b}$
Description	<p><math>h_c</math> is the convective heat transfer coefficient between clad and coolant  <math>(\frac{W}{m^2 \cdot ^\circ C})</math>  <math>k_c</math> is the clad conductivity (Unitless)  <math>h_b</math> is the initial coolant film conductance (Unitless)  <math>\tau_c</math> is the clad thickness (Unitless)</p>

#### **3.1.4 Instance Models**

There are no instance models.