


XRG Simulation GmbH



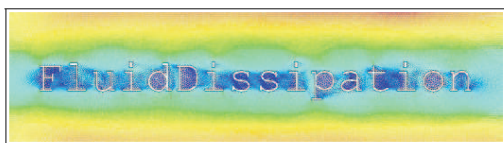
Project: Euroslib-D  
Workpackage 5.2 (FluidDissipation)

Ref: LVD-XRG-WP52  
Issue: A  
Date: June 26, 2009  
Page: 1 of 98

LIBRARY VERIFICATION DOCUMENT

This is a verification document of a new standard library for the modelling of heat transfer and pressure losses in energy systems comparing the results from all included functions with given data from referenced literature.


## Euroslib-D: Workpackage 5.2




### A Centralised Library for Modelling of Heat Transfer and Pressure Loss

Table 1: Project summary

Euroslib-D			
Responsibility:	Workpackage 5.2		
Reference:	LVD-XRG-WP52		
Task in project:	Development of a library for the modelling of heat transfer and pressure losses in energy systems		
Compiled by:	T. Vahlenkamp	Update:	June 26, 2009
Checked by:	S. Wischhusen	Update:	
Date of 1st issue:	29.06.2009	Date:	June 26, 2009
Pages:	98	Functions:	60
		Issue:	A



XRG Simulation GmbH



Project: Euroslib-D  
Workpackage 5.2 (FluidDissipation)

Ref: LVD-XRG-WP52  
Issue: A  
Date: June 26, 2009  
Page: 2 of 98

LIBRARY VERIFICATION DOCUMENT

## Contents

1	Library overview	4
2	Heat transfer	6
2.1	Channel	6
2.1.1	Even gap at laminar fluid flow regime	6
2.1.2	Even gap at overall fluid flow regime	11
2.1.3	Even gap at turbulent fluid flow regime	15
2.2	Helical pipe	18
2.2.1	Helical pipe at laminar fluid flow regime	18
2.2.2	Helical pipe at overall fluid flow regime	21
2.2.3	Helical pipe at turbulent fluid flow regime	24
2.3	Plate	27
2.3.1	Plate at laminar fluid flow regime	27
2.3.2	Plate at overall fluid flow regime	30
2.3.3	Plate at turbulent fluid flow regime	32
2.4	Straight pipe	34
2.4.1	Straight pipe at laminar fluid flow regime	34
2.4.2	Straight pipe at overall fluid flow regime	38
2.4.3	Straight pipe at turbulent fluid flow regime	42
3	Pressure loss	45
3.1	Bend	45
3.1.1	Curved bend for overall fluid flow considering surface roughness	45
3.1.2	Edged bend for overall fluid flow considering surface roughness	53
3.2	General	59
3.2.1	Generic geometry for ideal gas law	59
3.2.2	Generic geometry with density and viscosity dependence	63
3.2.3	Generic geometry considering pressure loss law	66
3.2.4	Generic geometry using pressure loss coefficient	71
3.2.5	Generic geometry using volume flow rate law	73
3.3	Orifice	76
3.3.1	Sudden changed cross sectional area of orifice	76
3.3.2	Thick edged orifice	80
3.4	Straight pipe	84
3.4.1	Straight pipe for laminar fluid flow regime	84
3.4.2	Straight pipe for overall fluid flow regime	88
3.4.3	Straight pipe for turbulent fluid flow regime	92