

ABENGOA BIOENERGY

RED Bioenergy Sustainability Assurance Scheme

Title:	Units conversion				
Code:	RBSA_003 Annex III	Revision:	02	Date:	2011 / 02 / 25

(C) This Abengoa Bioenergy document is protected by copyright. No part of this copyrighted document might be changed or amended. The document might not be duplicated or copied in any form or by any means for commercial purpose without permission of Abengoa Bioenergy. Abengoa Bioenergy disclaims all implied representations and warranties, including but not limited to, warranties of merchantability and fitness for a particular purpose.

Abengoa Bioenergy does not represent or warrant the accuracy or usefulness of the data and procedures enclosed. Neither Abengoa Bioenergy nor its affiliates will have any liabilities or responsibilities whatsoever with respect to any use of those data and procedures. The data and procedures hereby enclosed are subject to confidentiality for their business importance for Abengoa Bioenergy and cannot be disclosed and used without Abengoa Bioenergy authorisation.

Index

1	Objective	3
2	Table of equivalences units	3
2.1	Length equivalences	3
2.2	Mass equivalences	3
2.3	Pressure equivalences	3
2.4	Energy equivalences	3
2.5	Power equivalences	3
2.6	Volume equivalences	4
2.7	Density equivalences.....	4
2.8	Temperature equivalences	4

1 Objective

The objective of this Annex III is to define unit conversion that shall be used in case is needed. These equivalences are valid for all steps defined through RBSA_003. Source: Perry's Chemical Engineer's Handbook. The McGraw-Hill Companies, Inc. 1999.

2 Table of equivalences units

2.1 Length equivalences

Length equivalences				
units	m	miles	nautical miles	ft
m	1	6,214E-04	5,400E-04	3,2808
miles	1609,344	1	0,8690	5280,00
nautic miles	1852	1,1508	1	6076,12
ft	0,3048	1,894E-04	1,646E-04	1

2.2 Mass equivalences

Mass equivalences			
units	kg	lb	ton US
kg	1	2,20462	0,001102
lb	0,4535924	1	0,0005000
ton US	907,1847	2000,00	1

2.3 Pressure equivalences

Pressure equivalences						
units	Pa	atm	mm Hg [torr (0°C)]	lb/ft2	psi	in Hg (60°F)
Pa	1	9,869E-06	0,00750	2,089E-02	0,000145	2,961E-04
atm	101325	1	760	2116,2166	14,696	30,0058
mm Hg [torr (0°C)]	133,3224	0,001316	1	2,7845	0,01934	0,039481
lb/ft2	47,8803	0,000473	0,359	1	0,00694	0,014179
psi	6894,73	0,068046	51,715	143,9995	1	2,0418
in Hg (60°F)	3376,85	0,033327	25,328	70,5270	0,4898	1

2.4 Energy equivalences

Energy equivalences				
units	J	cal	kWh	Btu
J	1	0,2390	2,778E-07	9,478E-04
cal	4,184	1	1,162E-06	0,003966
kWh	3600000	860420,65	1	3412,14
Btu	1055,056	252,1644	0,000293	1

2.5 Power equivalences

Power equivalences			
units	W	cv	hp
W	1	0,00136	0,00134
cv	735,50	1	0,98632
hp	745,70	1,01	1

2.6 Volume equivalences

Volume equivalences		
units	m ³	gal US
m ³	1	264,17287
gal US	0,0037854	1

2.7 Density equivalences

Density equivalences				
units	g/cm ³	kg/m ³	lb/in ³	lb/ft ³
g/cm ³	1	1000	0,036127	62,4278
kg/m ³	0,001	1	3,613E-05	0,0624
lb/in ³	27,6799	27679,9	1	1728,00
lb/ft ³	0,0160185	16,0185	5,787E-04	1

2.8 Temperature equivalences

Temperature equivalences			
°C	(°F-32)·5/9	°F	°C·9/5+32
K	°C+273,15	°R	°F+459,67
K	°R·5/9		