

Guideline no. 67

Guidelines on good manufacturing practice for high pressure processed foods

Edyta Margas and John T. Holah

2011

© Campden BRI 2011
ISBN: 978 0 907503 69 9

Station Road, Chipping Campden, Gloucestershire, GL55 6LD, UK
Tel: +44(0)1386 842000 Fax: +44(0)1386 842100

www.campden.co.uk

Information emanating from this company is given after the exercise of all reasonable care and skill in its compilation, preparation and issue, but is provided without liability in its application and use.

Legislation changes frequently. It is essential to confirm that legislation cited in this publication and current at the time of printing, is still in force before acting upon it.

The information contained in this publication must not be reproduced without permission from the Publications Manager.

CONTENTS

	Page no.
1. INTRODUCTION TO HPP FOODS	1
<i>Carole Tonello, Craig Leadley, Miriam Quataert and Edyta Margas</i>	
1.1 HPP for pasteurisation and sterilisation	1
1.2 Current commercial applications	2
1.3 Process economics for conventional HPP	5
1.4 Decision support tool for novel technologies	6
2. FOOD SAFETY	8
<i>John Holah and Edyta Margas</i>	
2.1 General pasteurisation process risks	8
2.2 Microbial contamination of processed packs	8
2.3 Leaker spoilage	11
3. EQUIPMENT FOR HPP	14
<i>Craig Leadley, Carole Tonello, John Holah and Edyta Margas</i>	
3.1 Vertical and horizontal batch systems and semi-continuous systems	14
3.2 Hygienic design	16
3.3 Plant services	20
3.4 Required instrumentation and controls	20
3.5 Maintenance of HPP equipment	21
4. HPP PROCESS VALIDATION AND SHELF-LIFE	23
<i>Jacques Kastelein, Jos van der Vossen, Joan Poulis, Floor Boon and Edyta Margas</i>	
4.1 Consideration of the degree of lethal pressure required for pasteurised products	23
4.2 Sequence of decisions	25
4.3 Selection of packaging atmosphere	26
4.4 Process validation	27
4.5 Target microorganisms	27
4.6 Examples of products with target microorganisms: process, storage and shelf life considerations	28
4.6.1 Fruit juice	28
4.6.2 Cooked meat	31
4.7 Challenge testing and incubation trials	33
4.8 Pressure distribution	34
4.9 Thermal distribution	35
5. PACK DESIGN	36
<i>Sammy Iannace, Giuseppe Mensitieri and Edyta Margas</i>	
5.1 Flexible containers	37
5.2 Material selection	37

5.3	Pre-made pouches and bottles	40
5.4	Storage and handling	41
5.5	Approving packaging suppliers	42
6.	FILLING TECHNIQUES	43
	<i>Lynneric Potter and Edyta Margas</i>	
6.1	Pre-filling procedure	43
6.1.1	Pre-conditioning	43
6.1.2	Quality assurance checks - filling of pouches	44
6.1.3	Packaging loading	44
6.2	Control of weight/pack thickness	44
6.3	Coding	45
6.4	Pouch opening	45
6.5	Prevention of contamination in seal area	45
6.6	Entrapped air and headspace	46
7.	PACK SEALING	47
	<i>Lynneric Potter and Edyta Margas</i>	
7.1	Closures	47
7.2	Seal types	48
7.2.1	Heat sealing	48
7.2.2	Ultrasonic sealing	50
7.3	Quality assurance checks	50
8.	LOADING OF PACKS	52
	<i>Lynneric Potter and Edyta Margas</i>	
8.1	Hold time/temperature prior to process	52
8.2	Initial temperature for processing	53
8.3	Pack loading	53
9.	HPP PROCESS	55
	<i>Edyta Margas</i>	
9.1	Pre and post process pack segregation	55
9.2	Required control of the process	56
9.3	Quality checks of product and incubation trials	57
9.4	Process documentation	57
10.	POST PROCESS PACK HANDLING	59
	<i>Lynneric Potter and John Holah</i>	
10.1	Post process pack handling	59
10.2	Pack drying	60
10.3	Quality assurance checks	61

11. OUTER PACKAGING	62
<i>Lynneric Potter</i>	
11.1 Secondary packaging and palletisation	62
11.2 Transit packaging	63
11.3 Transport and storage conditions	63
12. CLEANING AND DISINFECTION	65
<i>John Holah</i>	
12.1 Open plant cleaning	66
12.2 Closed plant cleaning (CIP)	68
12.3 Cleaning frequencies	70
12.4 Environmental hygiene checks	71
12.4.1 Visual inspection	71
12.4.2 ATP testing	72
12.4.3 Microbiological assessment	72
13. PERSONAL HYGIENE	74
<i>John Holah</i>	
13.1 Personnel hygiene policy	75
13.2 Medical history	75
13.3 Induction training	76
13.4 Clothing	77
13.5 Handwashing	78
13.6 Monitoring and verification of personnel hygiene	80
14. GLOSSARY	81
15. REFERENCES	83
APPENDIXES	
APPENDIX I: METHODS FOR TEMPERATURE UNIFORMITY MAPPING IN HPP	89
APPENDIX II: LEGISLATIVE REQUIREMENTS	91
APPENDIX III: COMPRESSION BURST TEST	93
APPENDIX IV: INFLATION BURST TEST	94
APPENDIX V: MEASUREMENT OF SEALING CONDITIONS	95
APPENDIX VI: MEASUREMENT OF AIR CONTENT	97
APPENDIX VII: DYE PENETRATION TEST	98
APPENDIX VIII: PRESSURE UNITS CONVERSION TABLE	99