

# Contents

Page

<b>Foreword</b> .....	<b>v</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
3.1 General terms.....	1
3.2 Risk management.....	3
3.3 Storage, handling and operation.....	6
3.4 Extinguishing media, extinguishing systems and detection.....	9
<b>4 Guidance on how to use this document</b> .....	<b>9</b>
<b>5 Risk management</b> .....	<b>10</b>
5.1 General.....	10
5.2 Introduction to the risk management process.....	12
5.2.1 General.....	12
5.2.2 Definition of scope.....	12
5.2.3 Hazard identification.....	12
5.2.4 Risk estimation.....	12
5.2.5 Risk evaluation.....	13
5.2.6 Risk reduction/control.....	13
<b>6 Requirements for design and construction</b> .....	<b>14</b>
6.1 General.....	14
6.2 Specific risk considerations for handling of solid biofuel pellets.....	15
6.3 Risk areas.....	17
6.4 General requirements and recommendations for safe handling.....	17
<b>7 Requirements for safe operation and maintenance</b> .....	<b>18</b>
7.1 General.....	18
7.2 General requirement for operation, maintenance and manuals.....	18
7.3 Documentation of operation procedures.....	19
7.4 Safety during operation.....	20
7.4.1 Operation.....	20
7.4.2 Housekeeping.....	20
7.4.3 Maintenance.....	21
7.4.4 Guidelines for visitors/contractors.....	22
7.5 Pre-planning of emergency operations.....	23
7.6 Personnel risks.....	24
<b>8 Conveyor system and transfer points</b> .....	<b>24</b>
8.1 General.....	24
8.2 Detection.....	24
8.3 Preparatory measures.....	25
8.3.1 Fire protection.....	25
8.3.2 Explosion protection.....	26
8.4 Additional information, recommendation and requirements on design and protection of conveyor systems.....	27
8.4.1 General.....	27
8.4.2 Detection systems.....	27
8.4.3 Fire protection.....	27
8.4.4 Explosion protection.....	28
<b>9 Silos</b> .....	<b>28</b>
9.1 General.....	28
9.2 Detection and temperature and gas monitoring.....	29
9.3 Preparatory measures.....	29

9.3.1	Fire protection .....	29
9.3.2	Explosion protection .....	30
9.4	Additional information, recommendation and requirements on design and protection of silos .....	31
9.4.1	General .....	31
9.4.2	Detection systems .....	31
9.4.3	Fire protection systems .....	31
9.4.4	Explosion protection .....	35
<b>10</b>	<b>Large scale bunkers .....</b>	<b>35</b>
10.1	General .....	35
10.2	Detection and temperature and gas monitoring in bunkers .....	36
10.3	Preparatory measures .....	37
10.3.1	Fire protection .....	37
10.3.2	Explosion protection .....	37
10.4	Additional information, recommendation and requirements on design and protection of bunkers .....	38
10.4.1	General .....	38
10.4.2	Detection systems .....	38
10.4.3	Fire protection systems .....	38
10.4.4	Explosion protection .....	40
<b>11</b>	<b>Warehouse .....</b>	<b>41</b>
11.1	General .....	41
11.2	Detection .....	41
11.3	Preparatory measures .....	42
11.3.1	Fire protection .....	42
11.3.2	Explosion protection .....	42
11.4	Additional information, recommendation and requirements on design and protection of warehouse .....	43
11.4.1	Detection systems .....	43
11.4.2	Fire protection .....	43
11.4.3	Explosion protection .....	44
<b>Annex A (informative) Description of solid biofuel pellets supply chain and general safety guidelines for unit operations .....</b>		<b>45</b>
<b>Annex B (informative) Self-heating and off-gassing .....</b>		<b>60</b>
<b>Annex C (informative) Dust as a fire and explosion hazard and mitigation of risks .....</b>		<b>66</b>
<b>Annex D (informative) Safety aspects and guidance on handling various emergency situations .....</b>		<b>82</b>
<b>Annex E (informative) Ventilation for cooling of bulk material .....</b>		<b>97</b>
<b>Annex F (informative) Principle design of inert gas distribution system and inlet openings .....</b>		<b>98</b>
<b>Annex G (informative) Examples of arrangement of various sensors and detection systems relevant to the biofuel pellet industry .....</b>		<b>101</b>
<b>Annex H (informative) Example for the risk assessment in a commercial medium size wood pellet store .....</b>		<b>107</b>
<b>Bibliography .....</b>		<b>120</b>