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Testing of operators for industrial doors

1. Test object

Operators tested together with a vertically moving industrial doors equipped with FlexiForce hardware and panels. The door is described below:

Industrial door type	Vertical lift over head door
Door weight	550kg
Daylight width	4000 mm
Daylight height	7000 mm
Hardware	Flexi-Force Type
Balancing system for 550 kg	3 duplex torsion springs
	1 duplex (150kg) $l_1 = 1350$ mm
	$Di_1 = 95$ mm
	$D_1 = 8.0$ mm
	$L_2 = 1410$ mm
	$Di_2 = 152$ mm
	$D_2 = 10.0$ mm
	2 duplex (200kg) $l_1 = 1570$ mm
	$Di_1 = 95$ mm
	$D_1 = 8.5$ mm
	$L_2 = 1590$ mm
	$Di_2 = 152$ mm
	$D_2 = 11.0$ mm

2. Date of testing

The testing was performed, in accordance with EN 13241-1, from 2005-02-29 to 2005-07-26. The doors were selected by the client without assistance from SP. The test result shown in this report refers only to the tested sample.

3. Testing

3.1 Measuring of crushing forces

After the door had been mounted in a frame the crushing forces were measured in accordance with EN 12445 *Safety in use of power operated door – test methods*. The measuring equipment used was in accordance with the same standard.

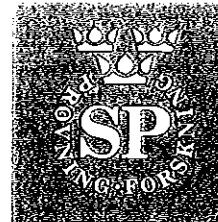
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The points of measuring were selected in accordance with what the standard describes for vertically moving doors. The measurements were performed, at ambient temperature and the closing speed was adjusted to the maximum speed of the specific door and operator combination. The maximum allowed force is specified in *EN 12453 Safety in use of power operated door – Requirements*.

3.2 Dangerous substances

The operators were examined in accordance with the requirements of the Construction Products Directive, CPD, (89/106/EEC). The interpretative Document Essential Requirements No 3 related to the CPD identifies aspects where hygiene, health and the environment may be concerned. Technical specifications are required to define release of pollutants to indoor air, outdoor air, soil and water, taking account of the concentration of pollutants in the products.

4 Test result

The operators were tested with different Control units and bottom rubber seals (safety edges), see following tables.

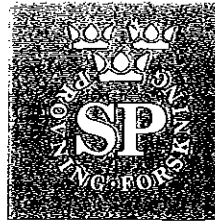
4.1.1 Summary of test results of crushing forces with Flexiforce vertical lift

Door Weight	Machinery	Control unit/ Sensor	Bottom seal rubber	Speed [mm/s]	Fulfils requirements
550 kg	Dalmatic Temec KVRFO)5 M1-22	Dalmatic Door Control V7/ Bircher DW 40	Flexiforce 1039-52	~245	Yes
550 kg	Dalmatic Temec KVRFO)5 M1-22	Dalmatic Door Control V7/ Bircher DW 40	Flexiforce 1039-55	~245	Yes
550 kg	Dalmatic Temec KVRFO)5 M1-22	Dalmatic Door Control V7/ Bircher DW 40	Fraba P259000	~256	Yes
550 kg	Dalmatic Temec KVRFO)5 M1-22	Dalmatic Door Control V7/ Bircher DW 40	Fraba P2575010605	~256	Yes
550 kg	Dalmatic Temec KVRFO)5 M1-22	Dalmatic Door Control V7/ Bircher DW 40	Novoferm 12860001	~300	Yes
550 kg	Dalmatic Temec KVRFO)5 M1-22	Dalmatic Door Control V7/ Fraba OSE	Flexiforce 1039-52	~201	Yes
550 kg	Dalmatic Temec KVRFO)5 M1-22	Dalmatic Door Control V7/ Fraba OSE	Flexiforce 1039-95	~344	Yes

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550 kg	Dalmatic Temec KVRFO)5 M1-22	Dalmatic Door Control V7/ Fraba OSE	Fraba P259000	~305	Yes
550 kg	Dalmatic Temec KVRFO)5 M1-22	Dalmatic Door Control V7/ Fraba OSE	Novoferm 12860001	~223	Yes
550 kg	Dalmatic Temec KVRO5MI H-30	Dalmatic B2 MB V.2/ Bircher DW 40	Flexiforce 1039-52	~253	Yes
550 kg	Dalmatic Temec KVRO5MI H-30	Dalmatic B2 MB V.2/ Bircher DW 40	Flexiforce 1039-55	~279	Yes
550 kg	Dalmatic Temec KVRO5MI H-30	Dalmatic B2 MB V.2/ Bircher DW 40	Flexiforce 1039-95	~453	Yes
550 kg	Dalmatic Temec KVRO5MI H-30	Dalmatic B2 MB V.2/ Bircher DW 40	Fraba P259000	~349	Yes
550 kg	Dalmatic Temec KVRO5MI H-30	Dalmatic B2 MB V.2/ Bircher DW 40	Novoferm 12860001	~289	Yes
550 kg	Dalmatic Temec KVRO5MI H-30	Dalmatic Door Control V7/ Bircher DW 40	Flexiforce 1039-52	~253	Yes
550 kg	Dalmatic Temec KVRO5MI H-30	Dalmatic Door Control V7/ Bircher DW 40	Flexiforce 1039-55	~274	Yes
550 kg	Dalmatic Temec KVRO5MI H-30	Dalmatic Door Control V7/ Bircher DW 40	Flexiforce 1039-95	~468	Yes
550 kg	Dalmatic Temec KVRO5MI H-30	Dalmatic Door Control V7/ Bircher DW 40	Fraba P259000	~349	Yes
550 kg	Dalmatic Temec KVRO5MI H-30	Dalmatic Door Control V7/ Bircher DW 40	Novoferm 12860001	~289	Yes
550 kg	Dalmatic Temec KVRO5MI H-30	Dalmatic Door Control V7/ Fraba OSE	Flexiforce 1039-95	~416	Yes



550 kg	Dalmatic Temec KVR05MI H-30	Dalmatic K.V.1/ Bircher DW 40	Flexiforce 1039-52	~253	Yes
550 kg	Dalmatic Temec KVR05MI H-30	Dalmatic K.V.1/ Bircher DW 40	Flexiforce 1039-55	~253	Yes
550 kg	Dalmatic Temec KVR05MI H-30	Dalmatic K.V.1/ Bircher DW 40	Flexiforce 1039-95	~468	Yes
550 kg	Dalmatic Temec KVR05MI H-30	Dalmatic K.V.1/ Bircher DW 40	Fraba P259000	~349	Yes
550 kg	Dalmatic Temec KVR05MI H-30	Dalmatic K.V.1/ Bircher DW 40	Novoform 12860001	~304	Yes

4.1.2 Measuring of crushing forces

Table 1 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic Door Control V7 Machinery: Dalmatic Temec KVRF(O)5M1-22 Sensor: Bircher DW40 Bottom seal: Flexiforce 1039-52

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	22	~245	377	92	Yes
Centre	22	~245	340	77	Yes
Right	22	~245	279	71	Yes

Table 2 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic Door Control V7 Machinery: Dalmatic Temec KVRF(O)5M1-22 Sensor: Bircher DW40 Bottom seal: Flexiforce 1039-55

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	22	~245	337	224	Yes
Centre	22	~245	395	210	Yes
Right	22	~245	356	214	Yes

Table 3 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic Door Control V7 Machinery: Dalmatic Temec KVRF(O)5M1-22 Sensor: Bircher DW40 Bottom seal: Fraba P259000

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	22	~256	74	0	Yes
Centre	22	~256	111	0	Yes
Right	22	~256	76	0	Yes



Table 4 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic Door Control V7
 Machinery: Dalmatic Temec KVRF(O)5M1-22 Sensor: Bircher DW40
 Bottom seal: Fraba P2575010605

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	22	~256	262	117	Yes
Centre	22	~256	134	0	Yes
Right	22	~256	119	0	Yes

Table 5 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic door control V7
 Machinery: Dalmatic Temec KVRF(O)5M1-22 Sensor: Bircher DW40
 Bottom seal: Novoferm 12860001

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	22	~300	302	160	Yes
Centre	22	~300	201	148	Yes
Right	22	~300	368	118	Yes

Table 6 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic Door Control V7
 Machinery: Dalmatic Temec KVRF(O)5M1-22 Sensor: Fraba OSE
 Bottom seal: Flexiforce 1039-52

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	22	~201	346	83	Yes
Centre	22	~201	334	80	Yes
Right	22	~201	274	75	Yes

Table 7 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic door control V7
 Machinery: Dalmatic Temec KVRF(O)5M1-22 Sensor: Fraba OSE
 Bottom seal: Flexiforce 1039-95

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	22	~344	203	114	Yes
Centre	22	~344	197	103	Yes
Right	22	~344	138	0	Yes

Table 8 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic door control V7
 Machinery: Dalmatic Temec KVRF(O)5M1-22 Sensor: Fraba OSE
 Bottom seal: Fraba P259000

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	22	~305	282	33	Yes
Centre	22	~305	211	27	Yes
Right	22	~305	71	0	Yes



Table 9 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic Door Control V7 Machinery: Dalmatic Temec KVRFO5M1-22 Sensor: Fraba OSE Bottom seal: Novoferm 12860001

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	22	~223	320	197	Yes
Centre	22	~223	257	199	Yes
Right	22	~223	243	186	Yes

Table 10 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic B2/B3 MB Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40 Bottom seal: Flexiforce 1039-52

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~253	379	70	Yes
Centre	30	~253	239	67	Yes
Right	30	~253	178	31	Yes

Table 11 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic B2/B3 MB Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40 Bottom seal: Flexiforce 1039-55

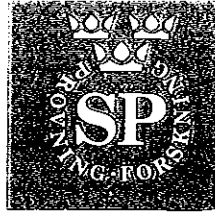
Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~279	317	200	Yes
Centre	30	~279	320	219	Yes
Right	30	~279	313	203	Yes

Table 12 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic B2/B3 MB Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40 Bottom seal: Flexiforce 1039-95

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~453	305	75	Yes
Centre	30	~453	143	0	Yes
Right	30	~453	149	0	Yes

Table 13 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic B2/B3 MB Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40 Bottom seal: Fraba P259000

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~349	388	68	Yes
Centre	30	~349	170	59	Yes
Right	30	~349	89	0	Yes



*Table 14 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic B2/B3 MB
Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40
Bottom seal: Novoferm 12860001*

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~289	328	149	Yes
Centre	30	~289	247	142	Yes
Right	30	~289	266	113	Yes

*Table 15 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic Door Control V7
Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40
Bottom seal: Flexiforce 1039-52*

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~253	346	67	Yes
Centre	30	~253	210	41	Yes
Right	30	~253	150	0	Yes

*Table 16 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic Door Control V7
Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40
Bottom seal: Flexiforce 1039-55*

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~274	339	205	Yes
Centre	30	~274	334	223	Yes
Right	30	~274	293	185	Yes

*Table 17 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic Door control V7
Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40
Bottom seal: Flexiforce 1039-95*

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~468	327	109	Yes
Centre	30	~468	237	122	Yes
Right	30	~468	153	21	Yes

*Table 18 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic Door Control V7
Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40
Bottom seal: Fraba P259000*

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~349	237	50	Yes
Centre	30	~349	156	36	Yes
Right	30	~349	76	0	Yes

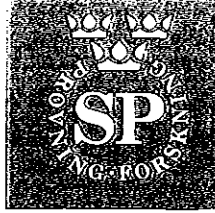


Table 19 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic Door Control V7 Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40 Bottom seal: Novoferm 12860001

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~289	218	139	Yes
Centre	30	~289	252	137	Yes
Right	30	~289	244	91	Yes

Table 20 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic door control V7 Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Fraba OSE Bottom seal: Flexiforce 1039-95

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~416	375	126	Yes
Centre	30	~416	191	93	Yes
Right	30	~416	102	0	Yes

Table 21 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic K.V.1 Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40 Bottom seal: Flexiforce 1039-52

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~253	291	60	Yes
Centre	30	~253	163	18	Yes
Right	30	~253	166	45	Yes

Table 22 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic K.V.1 Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40 Bottom seal: Flexiforce 1039-55

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~253	251	184	Yes
Centre	30	~253	268	182	Yes
Right	30	~253	264	191	Yes

Table 23 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic K.V.1 Machinery: Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40 Bottom seal: Flexiforce 1039-95

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~468	303	107	Yes
Centre	30	~468	238	121	Yes
Right	30	~468	134	0	Yes



*Table 24 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic K.V.1 Machinery:
Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40
Bottom seal: Fraba P259000*

Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~349	256	55	Yes
Centre	30	~349	141	0	Yes
Right	30	~349	75	0	Yes

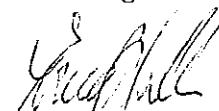
*Table 25 Door: Flexiforce vertical lift 550 kg Control unit: Dalmatic K.V.1 Machinery:
Dalmatic Temec KVRO5MIH-30 Sensor: Bircher DW40
Bottom seal: Novoferm 12860001*

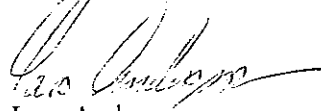
Position, from inside	Rotation [rpm]	Speed [mm/s]	Crushing force [N]	Time while force > 150 N [ms]	Unload within 5 s
Left	30	~304	366	145	Yes
Centre	30	~304	225	144	Yes
Right	30	~304	383	151	Yes

4.2 Dangerous substances

Door components described in this report are made of material that complies with the Construction Products Directive (89/106/EEC), see appendix 26.

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