Risk Assessment

related to

Reciprocating Saw
RS130B

presented by

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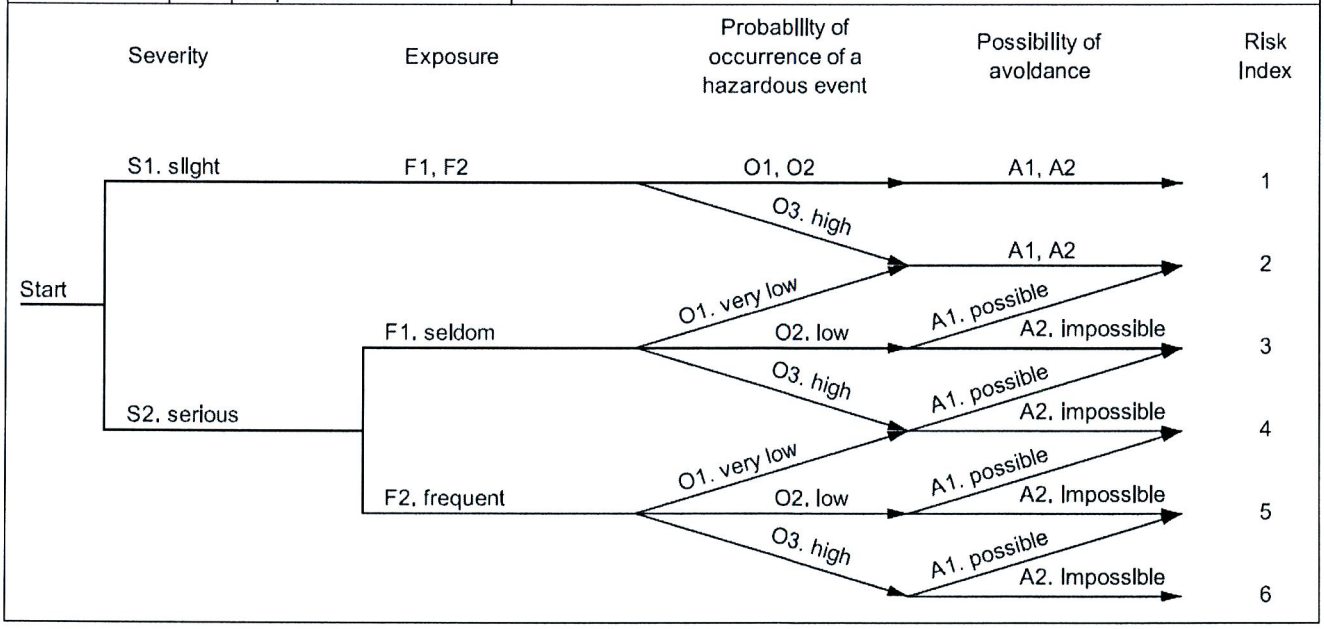
I. Overview of risk assessment:

Risk assessment report was carried out for above-mentioned machineries in accordance with the requirements of Machinery Directive 2006/42/EC& specific B-type& C-type standards that are described in previous pages. Afterward, risk has been estimated twice: once before protective measures have been chosen and a second time after they have been implemented.

At first, bottom-up approaches are adopted for hazard identification, hazards listed in table B.1 of EN ISO 12100:2010 & described in specified standard are considered.

Risk graph that based on a decision tree with is used and the associated hazard, hazardous situation, hazardous event and possible harm is described in accordance with ISO 12100:2010, clause 5 and 6. A risk index is then calculated using the risk graph given in Figure 1 and 2, based on the following four parameters, corresponding to the four elements of risk as defined in ISO 12100:2010, clause 5, and each having its particular limits.

Factor	Category		Criteria
Severity of harm	**S1**	Slight injury	Normally reversible; or requires only first-aid
	S2	Serious injury	Normally irreversible; or fatality; or requires more than first-aid
Exposure	**F1**	Infrequent exposure	Frequency: < 2 times / work shift or duration: < 15 min/ work shift
	F2	Frequent exposure	Frequency: > 2 times / work shift or duration: > 15 min/ work shift
Probability	**O1**	Rarely	Mature technology, proven and recognized in safety application
	O2	Sometime	Technical failure observed in the two last years
	O3	Regularly	Technical failure regularly observed (every six months or less) or
Avoidance	**A1**	Possible	Possible
	A2	Impossible	Impossible



After the first assessment, some measures to eliminate the risks are given for the modification of machine or of relative documents with taking into account the explicit C-type EN standard or related B-type standard.

While taking appropriate provisions for the existing risks, the procedures and principles to eliminate the risk according to the most general B-type standard for any kind of machine,
EN ISO 12100-1, are followed, i.e. :

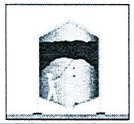
- First step: consider the possibility of eliminating risk at design stage.

- Second step: if impossible, protect the dangerous zone with appropriate design of safety guard or safety device.
- Third step: if above impossible, give warning signs to draw attention of operators about the residual risks.

In addition, some checklist drawn from the explicit C-type EN standards, which are found suitable for or near the characteristic of this machine, are used to help developing the provisions for the elimination of the risks.

Finally the risk assessment was carried out again to ensure this machine and its relative documents are totally compliance with the Machinery Directive.

Risk assessment_ Hazard identification				
Machine: Reciprocating Saw			**Model No.:** RS130B	
Method: Checklists: Annex B of EN ISO 12100: 2010			**Remark:** Cross reference: EN 60745-1:2009+A11:2010, EN 60745-2-11:2010	
Ref. No.	**Hazard**	**Accident scenario**	**Danger zone**	**Person**
1.0	**Mechanical hazards**	--	--	--
1.1	Crushing 	N/A	-	-
1.2	Shearing 	N/A	-	-
1.3	Cutting / severing 	Operator / maintenance staff may have such hazard when performing adjusting or maintenance	Cutting attachment	Operator, maintenance staff
1.4	Entanglement 	N/A	-	-
1.5	Drawing-in / trapping 	N/A	-	-
1.6	Impact 	Bystander may have impact hazard if the machine controlled by a lay man	Front side of the machine	Bystander
Ref. No.	**Hazard**	**Accident scenario**	**Danger zone**	**Person**
1.7	Stabbing / puncture 	N/A	-	-

1.8	Friction/ abrasion 	N/A	-	-
1.9	Slipping / tripping /falling 	N/A	-	-
1.10	Being run over/ throw 	N/A	-	-
1.11	Suffocation 	N/A	-	-
1.12	High pressure fluid injection 	N/A	-	-
1.13	Ejection of parts (material or workpiece) 	Bystander may have ejection hazard if the machine controlled by a lay man	Whole machine	Bystander
1.14	Loss of stability (of machinery and machine parts).	Loss of stability due to machine loaded uneven	Whole machine	Operator, maintenance staff
Ref. No.	**Hazard**	**Accident scenario**	**Danger zone**	**Person**
2.0	**Electrical hazards**	--		

2.1	Shock/ burn- direct/ indirect contact 	N/A	-	-
2.2	Electrostatic phenomenon	Shock due to electrostatic phenomenon.	Whole machine	Operator, maintenance staff
2.3	Electromagnetic phenomenon- effects on medical implants 	Effect on the medical implant or pacemaker due to electromagnetic phenomenon.	Whole machine	Operator, maintenance staff
2.4	Falling, being thrown	N/A	-	-
2.5	Fire	Fire due to burn wire or component cause by overload, over-current, overstress or inappropriate designation.	Whole machine	Operator, maintenance staff
2.6	Projection of molten particle	N/A	-	-
2.7	Thermal radiation	N/A	-	-
3.0	**Thermal hazards**	N/A	-	-
3.1	Burn 	N/A	-	-
3.2	Dehydration	N/A	-	-
3.3	Discomfort	N/A	-	-

Ref. No.	Hazard	Accident scenario	Danger zone	Person
3.4	Frostbite 	N/A	-	-

3.5	Injury by the heat radiation	N/A	-	-
3.6	Scald 	N/A	-	-
4.0	**Noise**	--		
4.1	Discomfort- tinnitus, tiredness 	Noise discomfort- tinnitus, tiredness due to long time operating the machine.	Operation area	Operator/ Bystander
4.2	Loss of awareness, balance, hearing	N/A	-	-
4.3	Indirect injury- interference with speech communication or with acoustic signal	N/A	-	-
5.0	**Vibration**	--		
5.1	Discomfort	Vibration discomfort- tinnitus, tiredness due to long time operating the machine.	Operation area	Operator/ Bystander
5.2	Low-back morbidity	N/A	-	-
5.3	Neurological disorder	N/A	-	-
5.4	Osteo- articular disorder	N/A	-	-
5.4	Trauma of the spine	N/A	-	-
5.6	Vascular disorder	N/A	-	-
Ref. No.	**Hazard**	**Accident scenario**	**Danger zone**	**Person**
6.0	**Radiation**	--		

6.1	Low / high frequency, radio frequency radiation, microwaves 	N/A	-	-
6.2	Infrared, visible and ultraviolet light 	N/A	-	-
6.3	X and gamma rays 	N/A	-	-
6.4	Alpha, beta rays, electron or ion beams, neutrons	N/A	-	-
6.5	Lasers 	N/A	-	-
7.0	**Material/ substance**	--		
7.1	Hazards resulting from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts 	N/A	-	-
7.2	Biological and microbiological (viral or bacterial) agent	N/A	-	-
Ref. No.	**Hazard**	**Accident scenario**	**Danger zone**	**Person**

7.3	Explosion / fire- combustible and flammable 	N/A	-	-
7.4	Poisoning- corrosive material, aerosol, toxic gas/ fluid/ fume/ mist, oxidizer	N/A	-	-
7.5	Sensitization- fiber	N/A	-	-
8.0	**Ergonomic**	--		
8.1	Discomfort- Unhealthy posture or excessive efforts	N/A	-	-
8.2	Visibility- inadequate local lighting	N/A	-	-
8.3	Mental overload or underload, stress etc.	N/A	-	-
8.4	Inadequate design, location or identification of manual controls	N/A	-	-
8.5	Inadequate design or location of visual display units	N/A	-	-
8.6	Repetitive activity, posture	N/A	-	-
8.7	Flicker, dazzing, shadow, stroboscopic	N/A	-	-
9.0	**Associated with environment**	--		
9.1	Lack of oxygen	N/A	-	-
9.2	Slipping, falling	N/A	-	-
9.3	Disease	N/A	-	-
Ref. No.	**Hazard**	**Accident scenario**	**Danger zone**	**Person**

9.4	Any other as a consequence of the effect caused by the sources of hazards of the machine or parts of the machine	N/A	-	-
10.0	**Combination**	N/A	-	-
11.0	**Other hazards**			
11.1	Failure/disorder of control system (unexpected start-up, unexpected overrun)	N/A	-	-
11.2	Restoration of energy supply after an interruption.	N/A	-	-
11.3	External influence on electrical equipment	N/A	-	-
11.4	Other external influences (gravity, wind, etc.)	N/A	-	-
11.5	Errors in the software	N/A	-	-
11.6	Errors made by the operator (due to mismatch of machine)	N/A	-	-
11.7	Breaking down	N/A	-	-
11.8	Liquid shock	N/A	-	-
11.9	Pressure relief device	N/A	-	-

Risk assessment & risk reduction												
Ref. No.	**Risk estimation** (Initial risk)					**Risk reduction / protective measures**	**Risk estimation** (Risk reduction)					**OK/ NG**
	S	**F**	**O**	**A**	**Index**		**S**	**F**	**O**	**A**	**Index**	
1.3	***2***	***1***	***1***	***1***	**2**	Proper warning message are provided in user's manual.	***2***	***1***	***1***	***1***	**2**	**OK**
1.6	***1***	***2***	***1***	***1***	**1**	Proper warning message are provided in user's manual.	*1*	*2*	*1*	*1*	**1**	**OK**
1.13	***1***	***1***	***3***	***1***	**2**	Proper warning message are provided in user's manual.	*1*	*1*	*3*	*1*	**2**	**OK**
1.14	***1***	***1***	***3***	***1***	**2**	Proper warning message are provided in user's manual.	*1*	*1*	*3*	*1*	**2**	**OK**
2.2	***1***	***2***	***3***	***1***	**2**	1. Wiring, layout, circuit and others are provided. 2. Proper warning signs & warning message are provided in user's manual.	*1*	*2*	*3*	*1*	**2**	**OK**
2.3	***1***	***1***	***1***	***1***	**1**	1. EMC declaration provided by manufacturer 2. Wiring, layout, circuit and others are according with EN 60745-1	*1*	*1*	*1*	*1*	**1**	**OK**
2.5	***1***	***1***	***1***	***1***	**1**	No easy ignition material in electrical system and chamber.	*1*	*1*	*1*	*1*	**1**	**OK**
4.1	***1***	***1***	***3***	***1***	**2**	Proper warning message are provided in user's manual.	*1*	*1*	*3*	*1*	**2**	**OK**
5.1	***1***	***1***	***3***	***1***	**2**	Proper warning message are provided in user's manual.	*1*	*1*	*3*	*1*	**2**	**OK**