Product Environmental Profile

Crydom DRC3 Solid State Contactor

(SOLICON DRC Series 3 Phase & Reversing)

A brand of

PEP ecopassport CSTI-2014-002-V1-EN

Custom Sensors & Technologies

Product overview

The main application of the Crydom DRC3 Solid state Contactor product range is an ON-OFF control device in which the load current is conducted by power semiconductors. The SSC requires relatively low control circuit energy to switch the output state from OFF to ON, or vice versa. Since this control energy is very much lower than the output power controllable by the contactor at full load, "power gain" in a SSC is substantial, frequently much higher than in an electromagnetic relay of comparable output rating.

This range consists of Solid State Contactor available in either 2 or 3 Controlled Legs. Includes forward or reversing direction and related interlock control. Up to 5 HP @ 480 VAC Motor Controller Rated. Additional smaller variations exist between products with in this product range.

The representative product used for the analysis is model number DRC3P48D400. The environmental impacts of this referenced product are representative of the impacts of the other products of the range which are developed with a similar technology.

The environmental analysis was performed in conformity with ISO 14040.

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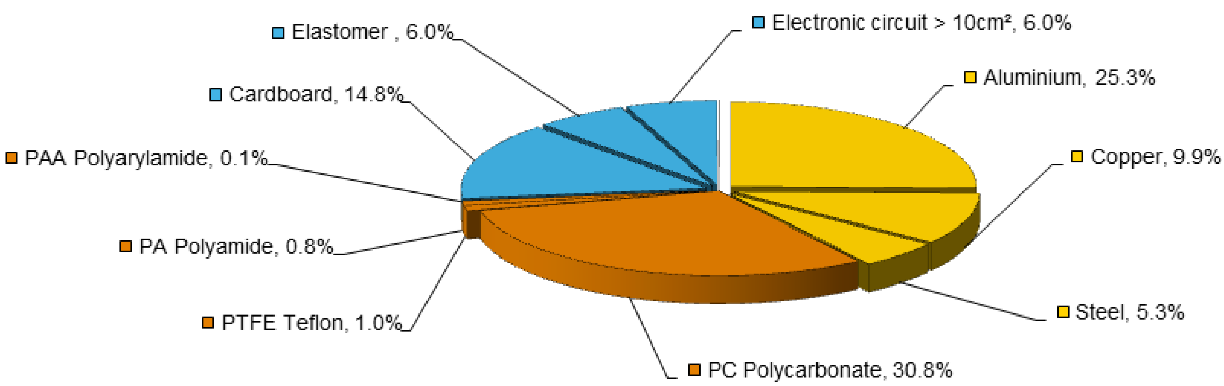
Constituent materials

The mass of the DRC3 products range varies 215.3g to 262.5g with packaging. It is 241.95 g for the Crydom DRC3 Solid State Contactor model number DRC3P48D400. The constituent weights of materials for the DRC3P48D400 are distributed as follows:



Substance assessment

Products of DRC3 Solid State Contactor range are designed in conformity with the requirements of the RoHS directive (European Directive 2002/95/EC of 27 January 2003 recast as Directive 2011/65/EU of 8 June 2011) and do not contain, or only contain in the authorised proportions, lead, mercury, cadmium, hexavalent chromium or flame retardants (polybrominated biphenyls - PBB, polybrominated diphenyl ethers - PBDE) as mentioned in the Directive and Conflict-free minerals.

Details of ROHS and REACH substances information are available on the http://www.crydom.com/. Environmental Information:

http://www.crydom.com/en/Service/EnvironmentalInformation.shtml

Manufacturing

The Crydom DRC3 Solid State Contactor product range is manufactured at a CST production site for which an ISO14001 certified environmental management system has been established.

Distribution/SHIPMENT

The weight and volume of the packaging have been optimized, based on the European Union's packaging directive.

The Crydom DRC3 Solid State Contactor packaging weight is 35.69 *g and* consists of cardboard.

The product distribution flows have been optimised by setting up local distribution centres close to the market areas.

Use

The products of the Crydom DRC3 Solid State Contactor range do not generate any environmental pollution (noise, emissions) requiring special precautionary measures in standard use.

The internally generated power dissipation depends on the conditions under which the product is implemented and used. This dissipated power is between 5.24W and 22.8 W for the Crydom DRC3 Solid State Contactor product range. It is 5.24 W for the referenced Crydom DRC3P48D400 Solid State Contactor.

This thermal dissipation represents less than 0.0082% of the power which passes through the product.

The product range does not require special maintenance operations.

End of life

At end of life, the products in the Crydom DRC3 Solid State Contactor range have been optimized to decrease the amount of waste and allow recovery of the product components and materials.

This product range contains a printed circuit board greater than 10 cm2 in area that should be separated from the stream of waste so as to optimize end-of-life by special treatments. The location of these components and other recommendations are given in the End of Life Instruction document which is available for this product range on the Crydom Environmental Information website:

http://www.crydom.com/en/Service/EnvironmentalInformation.shtml

The recyclability potential of the products has been evaluated using the "ECO DEEE recyclability and recoverability calculation method" (version V1, 20 Sep. 2008 presented to the French Agency for Environment and Energy Management: ADEME).

According to this method, the potential recyclability ratio is: **43.78%.** As described in the recyclability calculation method this ratio includes only metals and plastics which have proven industrial recycling processes.

Environmental impacts

Life cycle assessment has been performed on the following life cycle phases: Materials and Manufacturing (M), Distribution (D), Installation (I), Use (U), and End of life (E).

Modeling hypothesis and method:

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- The calculation was performed on the Crydom DRC3 Solid State Contactor product model DRC3P48D400.

- Product packaging: is included.

- Installation components: the product has a clip to mount it directly onto a DIN rail. Select wire size according to actual current. Additional information is available in the installation sheet provided with each product.

- Scenario for the Use phase: this product range is included in the category 1: (assumed service life is 20 years) and

- Use scenario is: Product dissipation = Max Current * loading rate (30% and service uptime percentage is 100%) * Voltage drop

= 7.6 Amps * 0.30 * 1.15Vrms*2(Channels) = 5.24W

(5.24W*24h*365Days)/1000 = 45.90 kWh per year

- The geographical representative area for the assessment is Mexico for the production with a distribution to Europe, use and end of life in Europe and the electrical power model used for calculation is European.

- End of life impacts are based on a worst case transport distance to the recycling plant (1000km).

Presentation of the product environmental impacts

Environmental indicators	Unit	Crydom DRC3 Solid State Contactor model DRC3P48D400					
		S = M + D + I + U + E	M	D	I	U	E
Air Acidification (AA for PEP)	kg H+ eq	7.16E-02	4.89E-04	2.91E-06	0.00E+00	7.11E-02	3.64E-06
Air toxicity (AT for PEP)	m³	8.87E+07	7.76E+05	4.31E+03	0.00E+00	8.79E+07	5.39E+03
Energy Depletion (ED for PEP)	MJ	1.05E+04	3.72E+01	2.89E-01	0.00E+00	1.05E+04	3.61E-01
Global Warming Potential (GWP for PEP)	kg CO_2 eq.	5.32E+02	2.42E+00	2.29E-02	0.00E+00	5.30E+02	2.86E-02
Hazardous Waste Production (HWP for PEP)	kg	8.93E+00	1.31E-01	8.51E-06	0.00E+00	8.80E+00	1.06E-05
Ozone Depletion Potential (ODP for PEP)	kg CFC-11 eq.	3.21E-05	3.25E-06	1.61E-08	0.00E+00	2.88E-05	2.02E-08
Photochemical Ozone Creation Potential (POCP for PEP)	kg C_2H_4 eq.	1.86E-01	8.27E-04	1.98E-05	0.00E+00	1.85E-01	2.48E-05
Raw Material Depletion (RMD for PEP)	Y-1	4.52E-14	3.33E-14	3.94E-19	0.00E+00	1.19E-14	4.93E-19
Water Depletion (WD for PEP)	dm3	1.54E+03	1.10E+01	2.74E-02	0.00E+00	1.51E+03	3.43E-02
Water Eutrophication (WE for PEP)	kg PO_4^{3-} eq.	1.43E-03	1.83E-04	3.80E-07	0.00E+00	1.24E-03	4.75E-07
Water Toxicity (WT for PEP)	m³	1.53E+02	7.46E-01	3.19E-03	0.00E+00	1.52E+02	3.98E-03

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Life cycle assessment has been performed with the EIME software (Environmental Impact and Management Explorer), version 5.1.2.1, and with its database version CODDE-2013-02.

The Use phase is the life cycle phase which has the greatest impact on the majority of environmental indicators.

According to this environmental analysis, proportionality rules may be used to evaluate the impacts (excluding Raw Materials Depletion) of other products of this range: The energy consumption of the product during the use phase is the parameter for which proportionality is valid. This is valid because the mass and composition of the product do not vary significantly within the product range, therefore manufacturing impacts will not change substantially. Additionally, the energy use for the product contributes the largest amount, by far, to the overall product impact for all product impact categories.

The lowest energy use calculated for the product range is 5.24 W or 45.93 kWh per year, for the 7.6 Amp rated product.

The highest energy use calculated for the product range is 22.77 W or 260.17 kWh per year, for the 22 Amp rated product.

System approach

As the products of the range are designed in accordance with the RoHS Directive (European Directive 2002/95/EC of 27 January 2003 recast as Directive 2011/65/EU of 8 June 2011), they can be incorporated without any restriction in an assembly or an installation subject to this Directive.

Please note that the values given above are only valid within the context specified and cannot be used directly to draw up the environmental assessment of an installation.

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Glossary

Raw Material Depletion (RMD) This indicator quantifies the consumption of raw materials during the life cycle of the product. It is expressed as the fraction of natural resources that disappear each year, with respect to all the annual reserves of the material.

Energy Depletion (ED) This indicator gives the quantity of energy consumed, whether it be from fossil, hydroelectric, nuclear or other sources. This indicator takes into account the energy from the material produced during combustion. It is expressed in mega joules (MJ).

Water Depletion (WD) This indicator calculates the volume of water consumed, including drinking water and water from industrial sources. It is expressed in cubic decimetres (dm^3).

Global Warming (GW) The global warming of the planet is the result of the increase in the greenhouse effect due to the sunlight reflected by the earth's surface being absorbed by certain gases known as "greenhouse-effect" gases. The effect is quantified in gram equivalent of carbon dioxide (CO_2).

Ozone Depletion (OD) This indicator defines the contribution to the phenomenon of the disappearance of the stratospheric ozone layer due to the emission of certain specific gases. The effect is expressed in gram equivalent of CFC-11.

Air Toxicity (AT) This indicator represents the air toxicity in a human environment. It takes into account the usually accepted concentrations for several gases in the air and the quantity of gas released over the life cycle. The indication given corresponds to the air volume needed to dilute these gases down to acceptable concentrations.

Photochemical Ozone Creation (POC) This indicator quantifies the contribution to the "smog" phenomenon (the photochemical oxidation of certain gases which generates ozone) and is expressed in gram equivalent of ethylene (C_2H_4).

Air Acidification (AA) The acid substances present in the atmosphere are carried by rain. A high level of acidity in the rain can cause damage to forests. The contribution of acidification is calculated using the acidification potentials of the substances concerned and is expressed in mode equivalent of H^+.

Water Toxicity (WT) This indicator represents the water toxicity. It takes into account the usually accepted concentrations for several substances in water and the quantity of substances released over the life cycle. The indication given corresponds to the water volume needed to dilute these substances down to acceptable concentrations.

Hazardous Waste Production (HWP) This indicator calculates the quantity of specially treated waste created during all the life cycle phases (manufacturing, distribution and utilization). For example, special industrial waste in the manufacturing phase, waste associated with the production of electrical power, etc. It is expressed in kilograms (kg).

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Verifier accreditation N° : VH08			Program information: www.pep-ecopassport.org	
Date of issue: 03-2014			Period of validity: 4 years	
Independent verification of the declaration and data, according to ISO 14025:2006				
Internal		External	X	
In compliance with ISO 14025:2006 type III environmental declarations				
PCR review was conducted by an expert panel chaired by J. Chevalier (CSTB).				
The elements of the actual PEP cannot be compared with elements from another program.				

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