

List of known and reported keel failures

Type of Failure	Boat	Year	Date	Race	Incident	Outcome	OSR Plan Review Certificate Age of Series date after 1 Jan 2010	Casualties	Location	Designer	LOA	Class	Launch	Keel type	Keel structure	Believed reason for failure
Welded fin failures:	ACCIONA	2013	03-Feb	Vendée Globe	Keel Broke off	Inverted	No	0	Atlantic	Owen Clarke	60	IMCOCA	2011	Canting	Welded Stainless Steel	Probably Fatigue
	VIRBAC-PAPREC 3	2013	21-Jan	Vendée Globe	Keel Broke off	No	No	0	Atlantic	Verdier/VPLP	60	IMCOCA	2010	Canting	Machined Steel Weldox	
	SAFRAN	2012	11-Nov	Vendée Globe	Keel Broke off	N/A	0	0	Atlantic	Verdier/VPLP	60	IMCOCA	2007	Canting	Welded Titanium	
	RAMBLER	2011	15-Aug	Fastnet Race	Keel Broke off	Inverted	N/A	1	IRL	Juan K	100	Maxi	2008	Canting	Cast/formed with welded additions	Previously measured loads used for the design of this keel were exceeded. Break was due to damage caused by metal fatigue, engendered by repeated shocks from contact with waves. There are no indications of a high-frequency vibration phenomenon.
	TIME TO BURN	2008	31-Aug	Delivery	Keel broke off	Inverted	N/A	1	New Zealand	Brett Bakewell-White	42		1994	Fixed		Fatigue crack adjacent to a weld resulted in catastrophic failure. Full detail unknown.
	HOOLIGAN V	2007	03-Feb	Delivery	Keel Broke off	Inverted	N/A	1	GBR	Simonis Voogd	35	Max Fun	2002	Fixed	Welded Steel Fin – S235JR (ST 37)	single 6 mm fillet weld specified on stressed and critical joints was inadequate, not in full compliance with ABS guidelines as the fore and aft modulus requirements were lower.
	SHOCKAZILLU	2006	13-Feb	San Diego	Keel Broke off	Inverted	N/A	0	San Diego	Hunter Marine	60	Schock 40		Fixed	welded	4 cracks in welds
	ECOVER	2005	03-Feb	Vendée Globe	Keel Broke off	N/A	0	0	Atlantic	Owen Clarke	60	IMCOCA		Fixed	Welded	Fatigue.
	SKANDIA(eKINGFISHER)	2005	24-Jan	Vendée Globe	Keel Broke off	N/A	0	0	Atlantic	Owen Clarke	60	IMCOCA		Fixed	Welded	Fatigue.
	EXCALIBUR	2002	16-Sep	Delivery	Keel Broke off	Inverted	N/A	4	AUS	Lyons	50			Fixed	Stainless steel welded fin	Home built. Inadequate welds. Designer exonerated.
DRUM	1985	Aug	Fastnet Race	Keel Broke off	Inverted	N/A	0	GBR	Laurie Davidson	30	Maxi	1985	Fixed	Welded	Failure of welds.	
Grounding or collision:	RIO	2012	10-Mar	San Diego-PV	Bulb broke off	N/A	0	0	MEX		52	TPS2		Fixed		Grounding - Bulb fell off - thread sheared on nuts
	SURLFEJ	2011	28-May	Training	Keel Broke off	Inverted	N/A	0	Solent,GBR	Juan K	25	IRC	2007	Fixed		Pounding on sandbank
	FOURBAM	2010		Cruising Charter	Keel Broke off	N/A	0	0	Scilly Isles,GBR	Jacques Fauroux	37	Jeanneau Sun Odyssey		Fixed		Hit rock
	PRB	2008	11-May	Artemis Transat	Keel damage	Abandoned	N/A	0	Atlantic	Farr	60	IMCOCA		Fixed		keel damage following collision with shark
	CIMENT SAINT LAURENT OCEAN	2003	Nov	Transat Jacques Vabre	Keel Broke off	Inverted	N/A	0	English Channel	Hunter Marine	60	IMCOCA	1989	Fixed		collision with object, abandoned then reboarded "...they were able to drop the keel, which threatened to tear it."
ARTECH- CAEN LA MER	2003	Oct	Transat 650	Keel Loose	N/A	0	0	Atlantic	J. Baptiste Pequet-Dejeanty	21	Mini Transat	2000	Fixed		The fixation of the canting keel broke following a shock with an object colliding with something and ripping off the keel	
CREALINE	1999	Oct	Transat 650	Keel Broke off	Abandoned	N/A	0		Pierre Roland	21	Mini Transat 264	1999	Canting			
CASTAWAY FLJI	1987	March	Melbourne-Osaka	Keel Broke off	Inverted	N/A	1	AUS	Laurie Davidson	52			Fixed			
Hull / Internal structure:	SKILGALAE	2008	31-May	Spirit Feet Regatta	Keel broke off	N/A	0	0	Long Island, USA	Johnstone	26	J/80 #21		Fixed		"keel and pump broke off - 8 inch wide by 4 foot long hole in the bottom and peeled fiberglass"
	BOUNDER	2007	02-Jul	Training	Keel Broke off	Inverted	N/A	0	GBR	Juan K	55	IRC	2007	Fixed		Unknown. Believed to be failure of internal structure.
	AUTO ATLANTIC THUNDERCHILD	2006	Jan	Cape Town - Bahia, Brazil	Keel Loose	N/A	0	0	Atlantic	Angelo Lavanos	52			Fixed		port side of the keel root became disconnected from the structural aluminum reinforcing
	MOQUINI	2005	14-Sep	Mauritius-Durban	Keel Broke off	Inverted	N/A	6	Mauritius	Simonis	42	Fast 42		Fixed	Solid	Keel floors failed and keel separated from hull. sub-standard lamination of the hull near the keel. insufficient inspection of the hull condition. Insufficient torque procedure to ensure the keel was secure, non-conformity to design specifications, and "poor workmanship".
	BAVARIA MATCH 38	2005	25-Apr	Bovazov to Vedice	Keel Broke off	Inverted	N/A	1	Croatia	Doug Peterson	38	Bavaria Match	2004	Fixed		Hull laminate failure
RISING FARRSTER	2001	01-Apr	Delivery	Keel Broke off	Inverted	N/A	2	AUS	Farr	38	Farr 38	1993	Fixed		The primary cause of the failure was inadequate hull shell thickness in way of the keel washer plates resulting in the keel separating from the fatigue and shear stress on the fiberglass hull	
MARINE MARINE	1991	30-Dec	Japan-Guam	Keel Broke off	Inverted	N/A	7		Farr	35	IOR		Fixed			
Keel bolts:	STREWTH	2008	21-Mar	China Sea Race	Keel broke off	N/A	0	0	Hong Kong	Jim Donovan	52	TPS2	2004	Fixed		2 keel bolts - one had sheared off during Transpac
	VOTRE NOM AUTOUR DU MONDE	1997	27-Feb	Vendée Globe	Keel Broke off	Inverted	N/A	0	Biscay	Briand	60	IMCOCA	1989	Fixed		Keel bolts broke
	MARTELLA	1990	26-Feb	Whitbread	Keel Broke off	Inverted	N/A	0	Atlantic	German Frers	80	Maxi	1989	Fixed		Loose bolts
Keel cant system:	SKANDIA WILD THING	2004	28-Dec	Sydney-Hobart	Keel Broke off	Inverted	N/A	0	AUS	Adrian Thompson	98	Maxi		Canting		Failure of cant actuation system allowed keel to come free from its mountings resulting in internal damage and the keel separating from the Keel Ram failure
	ONE DREAM-ONE MISSION	2001	Dec	Delivery	Keel Loose	Abandoned	N/A	0	Brazil		50	Open 50		Canting		
Undefined:	SOLID AIR	2013	12-Jun	Bermuda 1-2	Keel loose	Abandoned	No	0	USA	Tim Kernan	32	Columbia 32 C	2012	Fixed/Retractable?		
	NISSAN	2012	Aug	Delivery	Keel broke off	Inverted	N/A	0	Sardinia, ITA	Lombard	21	Mini Transat 417	2003	Canting		
	PETRA	2012	19-May	Cruise	Keel broke off	Inverted	N/A	0	Atlantic	Axel Mohrhaupt	39	Bavaria 390 Lagoon	1990	Fixed		
	INITIATIVES-ALEX OLIVIER	2011	06-Nov	Jacques Vabre	Keel Broke off	N/A	0	0	Atlantic	Simon Rogers	40	Class 40	2007	Fixed		In their last report (26.5.12) they mention, the keel came loose, just when they had abandoned the boat the keel fell off, capsized and sank.
	WASABI	2011	31-Jul	Sydney Gold Coast	Keel Broke off	N/A	0	0	Australia	Sayer	40		2006	Fixed		
	NAPADELIS	2011	23-Apr	Demi Cle	Keel damaged	Inverted	N/A	0	France	Bernard Nivellet	21	Mini Transat 569 - Mastral	2004	Fixed		
	MARINARIELLO	2010	Sep	San Giovanni-Treste	Keel Broke off	Inverted	N/A	0	Adriatic Sea	Farr	40	Cockoon	1993	Fixed		keel was changed
	WARRIOR'S WISH	2010	11-Aug	Delivery	Keel Broke off	N/A	0	0	Pacific	Jutson	30	Mount Clay 30		Fixed		
	TOUCH OF GLOSS	2009	22-Oct		Keel Broke off	N/A	0	0	Auckland	Farr	33	Farr MRX		Fixed		fractured - 'chiller' in casting created weakness
	HEAT WAVE	2009	30-Mar	Farallones	Keel Broke off	Inverted	N/A	0	San Francisco	Johnstone	26	J/80 #45	1994	Fixed		
	SAFRAN	2009	09-Feb	Vendée Globe	Bulb Broke off	N/A	0	0	Atlantic	Verdier/VPLP	60	IMCOCA	2007	Canting		keel fell off
	VEOLIA ENVIRONNEMENT	2009	29-Jan	Vendée Globe	Keel Broke off	N/A	0	0	Atlantic	Lombard	60	IMCOCA	2004	Canting	carbon fibre	keel head detached
	VM MATERIEUX	2009	06-Jan	Vendée Globe	Bulb broke off	Inverted	N/A	0	Cape Horn	Lombard	60	IMCOCA	2004	Canting		bulb fell off
	TEMENOS	2009	12-Dec	Vendée Globe	Loose keel	N/A	0	0	Southern Ocean	Owen Clarke	60	IMCOCA	2006	Canting	carbon fibre	damaged keel box
	HAYAI	2008	28-Dec	Portimao Ocean Race	Bulb broke off	Abandoned	N/A	0	Southern Ocean	Stephen Baker	40	Open 40		Canting		
	PAROLE	2008	14-Jun	Mini Fastnet	Keel broke off	N/A	0	0	France	Andrew Cape	21	Mini Transat 276	1999	Canting		
	GRAND PRIX II	2008	02-Feb	South Atlantic Cup	Keel broke off	Inverted	N/A	0	Uruguay	Edgardo Martinelli	26	GP 26		Fixed		Steel fin lead bulb Displacement 1100kg, Ballast 500kg
	MAXIMUS	2007	18-Dec	Delivery	Keel cracked	N/A	0	0	Tasman	Greg Elliott	100	Maxi	2005	Fixed		
	GI GO 2	2007	27-Sep	Cruising	Keel Broke off	Inverted	N/A	0	Indian Ocean	Vismara	54			Fixed		
	HUGO BOSS	2006	23-Nov	Velux 5 Oceans	Loose keel	Abandoned	N/A	0	Southern Ocean	Lombard	60	IMCOCA		Canting		
	TMI TECHNOLOGIES	2006	10-Nov	Route du Rhum	Loose keel	Abandoned	N/A	0	Atlantic	Finot-Conq	40	Class 40 - Page	2006	Fixed		
	MOVISTAR	2006	20-May	Volvo Ocean Race	Loose keel	Abandoned	N/A	0	Atlantic	Farr	70	Volvo 70	2005	Canting		Keel problems
	SILL VEOLIA	2005		Vendée Globe		N/A	0	0	Lombard	60	IMCOCA	2004	Canting			
	CHEMNEES POLYQUILAT	2004	07-Jun	The Transat	Keel Broke off	Inverted	N/A	0	Atlantic	Pierre Roland	60	IMCOCA	2000	Canting		http://www.sailingbreezes.com/Sailing_Breezes_Current/Articles/July03/dsaster.htm
	EVEREST HORIZONTAL	2003	23-Jun	Bermuda One-Two	Bulb broke off	Inverted	N/A	0	USA	Jim Artem	50	Open 50	2003	Canting		
	UP THE BLUE	2002	May	Delivery AUS-NZL	Keel Broke off	N/A	0	0	Tasman	Bakewell-White	21	Mini Transat 403	2002	Canting		
	ORACLE	2000	22-Nov	Training	Keel Broke off	N/A	0	0	Auckland		82	IACC		Fixed		
	LECLERC SAINT NICOLAS	1999	Oct	Transat 650	Keel Broke off	N/A	0	0	Spain	Raison-Lucas	21	Mini Transat 232	1999	Canting		
	VULCANGAS	1999	Oct	Transat 650	Keel Broke off	Abandoned	N/A	0	Finisterre	Romanelli	21	Mini Transat 182	1997	Fixed		
	NAVIFAX	1999	30-Sep	Transat 650	Keel Broke off	Abandoned	N/A	0	Finisterre	Finot-Conq	21	Mini Transat 197	1998	Fixed		
	EXIDIC CHALLENGER	1997	04-Jan	Vendée Globe	Keel Broke off	Inverted	N/A	0	Atlantic	Smith/Noble	60	IMCOCA	1993	Fixed	carbon fibre	
	FRANCE 2	1995	Feb	America's Cup	Keel Broke off	N/A	0	0	San Diego		82	IACC		Fixed		
	VILLE DE CHERBOURG	1994	Nov	Route du Rhum	Keel Broke off	Inverted	N/A	0	Atlantic	Joubert-Nivellet	60	IMCOCA	1992	Fixed		
	MAGIC MACHINE	1993	June	Round Britain Race	Keel Broke off	Inverted	N/A	0	Eastbourne		82	Trident 44		Fixed		
	COYOTE	1992	27-Oct	Delivery	Bulb broke off	Inverted	N/A	1	Atlantic	Rodger Martin	60	IMCOCA		Fixed	carbon fibre	"failure of the carbon fiber materials used to secure the 8,400 pound bulb"
	MISCO COMPUTER	1992	August	Quebec-St Malo	Keel Broke off	Inverted	N/A	0	Atlantic	Berret	50			Fixed		
	36.17 ORI	1991	Oct	Transat 650	Keel Broke off	N/A	0	0	Atlantic	Berret	21	Mini Transat	1991	Fixed		
	ESPANA 92	1991		Training	Keel Broke off	N/A	90 degrees	0	Palma, ESP		82	IACC		Fixed		
	PANDEMONIUM	1989	July	Delivery	Keel Broke off	Inverted	N/A	0	Pacific	Nelson/Marek	66		1985	Fixed		
	FIAT REGATTA	1984		Figaro	Keel Broke off	Sank	N/A	0	France	Tony Castro	30	Sunfast	1984	Fixed		Sank in 6 minutes after the loss of its keel