

■ AgustaWestland **AW**¹³⁹

■ **ICING COMPATIBILITY
REFERENCE HANDBOOK**



AgustaWestland AW¹³⁹

ICING COMPATIBILITY REFERENCE HANDBOOK

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AW139 and AB139 are two commercial trademarks of the same Aircraft produced by the same Manufacturer.

They identify two batches of aircraft manufactured in conformity with a unique Type Certificate Data Sheet

- AB139 up to SN 31054;
- AW139 from SN 31055 onward.

Where not specifically declared, the content of this document is applicable to both AW139 and AB139 helicopters.


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LISTA DELLE REVISIONI - REVISION HISTORY

REVISIONE ISSUE	DESCRIZIONE MODIFICHE CHANGE DESCRIPTION	DATA EMISSIONE ISSUE DATE	DATA APPLICABILITA APPLICABILITY DATE
A	<i>First Issue</i>	23/12/2009	19/02/2010
PAGES 10 + A3			
B	<i>Pag.5: added ref.[3]</i> <i>Pag.6: upgraded FIPS operations placard layout</i> <i>Pag.A2: added "(ice clearance and EMC)"</i> <i>Pag.A3 and A4: added last column</i> <i>Pag.A4: added list of kits cleared for EMC on h/c S/N 31269 and 31277</i>	06/09/2010	06/09/2010
PAGES 12 + A4			
C	<i>Pag.5: added refs.[4] and [5]</i> <i>Pag.A4: added Lighting External Area, Dual Rescue Hoist, Enhanced Landing Lights and kits cleared for EMC on h/c S/N 31333, 31378 and 41226</i>	16/12/2011	16/12/2011
PAGES 6 + A4			
D	<i>Pag.6: added LIPS aspects and refs.[6]and [7]</i> <i>Pag.7: added HIRF/EMC clearance verification and LIPS/FIPS clearance difference</i> <i>Pag.8 and A2: added LIPS</i> <i>Pag.A3-A6: added LIPS columns</i>	15/03/2013	15/03/2013
PAGES 8 + A6			
E	<i>Pag.6: added EASA limitation for LIPS and removed refs.[4]-[7]</i> <i>Pag.A2: added limitation for tail rotor blades on LIPS</i> <i>Pag.A3-A6: removed ICE/EMC distinction</i>	21/03/2013	21/03/2013
PAGES 8 + A6			



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F	<p><i>Pag.A4 and A6: added kits Trakka A800 Search Light cleared with NDC 139G3340-001; FLIR Ultraforce 350 and Hoist Camera GR cleared for EMC on h/c S/N 31510 with NDC 3G3000-009; kit SAT/COM Skytrac ISAT-200 cleared on 31431 with NDC 3G3000-010; kits Searchlight NIGHTSUN II XP, EGPWS -030, GPS SBAS and FMS, 2nd GPS SBAS cleared on 41372 with NDC 139G3000-001</i></p>	<p>19/06/2014</p>	<p>19/06/2014</p>
<p>PAGES 8 + A6</p>			
G	<p><i>Pag.8: modified the LIPS placard in accordance with the updated drawings and RFM.</i></p> <p><i>Pages from A3 to A6: added kits cleared for LIPS on helicopters S/N 31571/31579, ref. NDC 139G3000-005; kit Single Rescue Hoist cleared for FIPS on S/N 41375, ref. NDC 139G3000-004 and kits cleared for FIPS on S/N 31499</i></p>	<p>19/12/2014</p>	<p>19/12/2014</p>
<p>PAGES 8 + A6</p>			
H	<p><i>Pages from A3 to A6: added kits cleared for FIPS on helicopter S/N 31586, ref. NDC-139G3000-006</i></p>	<p>27/02/2015</p>	<p>27/02/2015</p>
<p>PAGES 9 + A6</p>			
I	<p><i>Page A6: added kit FLIR LEO III HD, cleared for FIPS on helicopters S/N 31581, ref. NDC-139G9350-007</i></p>	<p>08/05/2015</p>	<p>08/05/2015</p>
<p>PAGES 9 + A6</p>			
J	<p><i>Pages from A3 to A7: added kits cleared for LIPS on helicopters S/N 31571/31579, ref. NDC-139G3000-007 and kit External Loudspeakers 900W, cleared for FIPS on helicopter S/N 41404, ref. NDC-139G2350-003</i></p>	<p>30/06/2015</p>	<p>30/06/2015</p>
<p>PAGES 9 + A7</p>			
K	<p><i>Pages from A3 to A7: added new kits dashes, having no impact on ice accretion or EMC, therefore cleared with no further justifications</i></p>	<p>05/08/2015</p>	<p>05/08/2015</p>
<p>PAGES 9 + A7</p>			



L			
PAGES 10 + A7	<i>Page A7: added new kit FLIR SAFIRE 380HDc, cleared for FIPS on helicopter S/N 31715</i>	11/12/2015	16/12/2015
M			
PAGES 10 + A7	<i>Page A3: added new kits SNOW SKIDS and SLUMP PADS, cleared for FIPS and LIPS, ref. NDC-139G3271-001</i>	31/05/2016	31/05/2016
N	<i>Added Acronyms list, para. 4.1, and Document Status, para. 5.</i>		
PAGES 11 + A7	<i>Modified para. 4.2, 6 and pag.A2 to align the definition of "ice sensitive" modification to the document 139G3000E005.</i> <i>Page A1 and A7: added kits H.F.V., ECS AGB Enviro and OPLS, cleared for FIPS on helicopter S/N 31755, ref. NDC-139G9850-026; added kit L.S.S. P/N 4G9810F00114, cleared for FIPS with NDC-139G9810-002.</i> <i>Removed Digital Map, P/N 4G9310F00511, from page A5, because the kit does not have external shapes, therefore not to be included in the table. The EMI clearance of this kit with the FIPS and LIPS kits is managed by doc. 139G9850A001.</i>	30/01/2017	12/04/2017
O			
PAGES 11 + A7	<i>Pages from A3 to A7: added kits cleared for LIPS on helicopters S/N 31788, ref. NDC-139G3000-008 and kits Trakka A800 Search Lights P/N 4G3340F02413-14, cleared for LIPS and FIPS with NDC-139G3340-009</i>	15/05/2018	05/07/2018



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P	<i>Page from A3 to A7: added kits cleared for FIPS on helicopters S/N 31999, ref. NDC-139G3000-010 and added kits cleared for LIPS on helicopters S/N 32037, ref. NDC-139G3000-011. Kit Footstep Fast Removal P/N 4G5260F00312, cleared for LIPS and FIPS with NDC-139G5260-003. Kit SAR Protection Pilot-Pax Footstep P/N 4G5260F00512 and Kit Protection Sponson for Footstep P/N 4G5260F00711, cleared for LIPS and FIPS with NDC-139G5260-004.</i>		
PAGES 12 + A7	<i>Added new retromod dashes for kit Hoist and kit Double Hoist covers, having no impact on ice accretion or EMC, therefore cleared with no further justifications</i>	23/02/2024	28/02/2024

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1 SCOPE

The scope of this document is:

- to keep trace of the AW139 helicopter configuration cleared for flight into known icing conditions;
- to provide the means to determine if a given AW139 configuration is cleared for flight into known icing conditions.

These two aspects are approached in relation to both the Full Ice Protection System (FIPS, P/N 4G3000F00211) and to the Limited Ice Protection System (LIPS, P/N 4G3000F00111): it has to be considered that the allowed ice envelopes relevant to the two systems are different, but also their EMC behaviour is different, therefore a configuration could be cleared for flight into the limited ice envelope (LIPS installed) but not in the full ice envelope, and vice-versa (FIPS installed).

It has to be noted that the Limited Ice Protection System is approved exclusively by EASA, for North Sea operations in the defined limited ice envelope.

2 APPLICABILITY

This handbook is intended to be applied to the AW139 helicopters equipped with LIPS kit (refer to columns 3 and 4 of the table included in Annex A) or FIPS kit (refer to columns 5 and 6 of the table).

3 RELATED DOCUMENTS

3.1 Reference Documents

- | | | |
|-----|----------------|---|
| [1] | 139G3000E005 | AW139 Icing Clearance Policy |
| [2] | 139G3000N001 | AW139 FIPS Compliance to 29.1419 Requirements |
| [3] | 139G9850T031/2 | AW139 FIPS EMC Test Report |
| [4] | 139G3000N002 | AW139 LIPS Compliance to Special Condition F-15 |



4 ACRONYMS AND DEFINITIONS

4.1 Acronyms

AW	AgustaWestland
EASA	European Aviation Safety Agency
EMC	Electro Magnetic Compatibility
FAR	Federal Aviation Regulations
FIPS	Full Ice Protection System
HIRF	High Intensity Radiated Fields
JAR	Join Aviation Requirements
LIPS	Limited Ice Protection System
LWC	Liquid Water Content
OAT	Outside Air Temperature
P/N	Part Number
STC	Supplemental Type Certificate



4.2 Definitions

Any modification (new kits, equipments or AW139 basic helicopter modification) is defined as "ice sensitive" (ref.[1]) if one at least of the following conditions are met:

- 1) It has parts, protruding from the helicopter silhouette, which can collect ice with the helicopter flying in an icing cloud. Once accreted in such external parts, the ice can shed from the surface in blocks of remarkable dimensions and hit the helicopter critical parts. Ice accreted on the external surfaces can also disturb the airflow to the engine intakes, increase the helicopter drag and therefore significantly reduce its performance or cause an increase in loads and vibrations, leading to structural failures of the helicopter components. Finally the ice accreted on "ice sensitive" items can lead to malfunctions of them (for example lights, cameras or antennas).
- 2) It has intakes or openings which can collect ice. Once accreted in these zones the ice can clog the openings, causing malfunction of the item itself.

When a modification, which involves an "ice sensitive" item with external shapes or openings, has to be certified, it must be ice cleared in respect of the LIPS or FIPS kit following the logic described in this document, because excessive ice accreted on the item can put the helicopter into hazardous conditions for one of the reasons above, or cause the malfunction of the item itself. In this case the malfunction of the part due to ice accretion does not necessarily prevent the ice clearance, provided that the helicopter can safely fly in ice.

Once the modification is assessed from an ice accretion point of view, it has to be verified also from an HIRF/EMC point of view, with the aim of assessing if the modification itself causes interference with the FIPS or LIPS kit (depending on the helicopter configuration). In this case the ice clearance cannot be given, unless a mean of eliminating the interference is provided.

5 DOCUMENT STATUS

This documents is revised every time a new "ice sensitive" modification (e.g. a new kit certified on the AW139) is cleared in respect of the LIPS or FIPS kits, for both the aspects of ice accretion and EMC described in the next paragraph. Once cleared, the modification is included in Annex A.

6 ICE CLEARANCE LOGIC

The AW139 is allowed to fly into known icing conditions by installing and operating the FIPS or LIPS, which are incompatible, therefore cannot be installed simultaneously.

Each of them has a peculiar certified icing envelope in which the helicopter can safely operate, as defined in the documents refs.[2] and [4]: in particular the LIPS envelope (limited in LWC and OAT) is a sub-case of the FIPS envelope, which allows the helicopter to fly with no limitations in the known ice conditions of the FAR/JAR regulations.

Additionally, including different components and sub-systems, the behaviour of the two systems in respect of the HIRF/EMC interferences is different.



Taking into account these aspects, from an ice accretion point of view, a certain configuration could be cleared for flying into the icing conditions of the LIPS, but not of the FIPS (having a larger ice envelope more ice could accrete); but from an HIRF/EMC point of view a configuration could be cleared in respect of the LIPS but not of the FIPS, and vice-versa.

For this reason this document deals separately with the configurations cleared for LIPS and FIPS, giving the list of the “ice sensitive” kits which can be installed and operated with one kit or the other.

In order for a given AW139 configuration to be considered ice cleared, all the conditions here below have to be positively assessed:

- The LIPS (P/N 4G3000F00111) or FIPS kit (P/N 4G3000F00211) must be installed.
- All "ice sensitive" kits, equipments or modifications installed, meeting the conditions 1) or 2) of the para. 4.2., are included in the Annex A of this document, referring to the appropriate LIPS or FIPS columns. If one of the ice cleared equipments here included is installed, it has to be verified that the relevant restriction is applied.
- All the ice sensitive kits which can cause EMC interferences with the LIPS or FIPS (depending on what's installed) and which meet the conditions 1) or 2) of the para. 4.2 are listed in the Annex A of this document.

Therefore, ice sensitive modifications with no external shapes or openings, but with potential HIRF/EMC interference with the FIPS or LIPS, are not object of this document.

7 PLACARDS

With the FIPS installed, if the AW139 configuration is cleared for flight into known icing conditions, the placard below has to be installed:

APPROVED TYPES OF OPERATION

- DAY/NIGHT VFR
- DAY/NIGHT IFR IN ICING CONDITIONS
- FLT IN FREEZING RN/DZ OR SLD PROHIBITED

With the LIPS installed (configuration cleared in icing) the following placard is required:

APPROVED TYPES OF OPERATION
VFR (DAY/NIGHT) / IFR
LIMITED ICING CONDITIONS
FLT IN FREEZING RN/DZ/SLD PROHIBITED



If the helicopter configuration is not cleared in ice the placard has to be replaced with the basic AW139 one, reported here below:

- APPROVED TYPES OF OPERATION
- DAY/NIGHT VFR
- DAY/NIGHT IFR
- ICING PROHIBITED

8 CHANGES TO THE APPROVED CONFIGURATION

Any change in the AW139 configuration, if considered "ice sensitive" or causing HIRF/EMC interferences with the LIPS or FIPS, has to be cleared for flight into known icing conditions following the Icing Clearance Policy (document ref.[1]).

Modifications can be introduced to the "ice sensitive" items, to allow the icing clearance to be obtained, such as aerodynamic fairings (reducing the ice collection of the protruding parts), passive or active protection of the surfaces (screens, electro-thermal heating, pneumatic boots or other means).

The clearance for flight into known icing conditions of STC installations and modifications is completely upon responsibility of the STC holders.



ANNEX A

TITLE ***LIST OF ICE CLEARED EQUIPMENTS***



This annex contains the list of equipments cleared for flight into known ice conditions.

WARNING

As stated in the relevant certification process, the LIPS configuration is certified with tail rotor blades P/N 3G6410A00133 only.

Utilisation or mixing with tail rotor blades P/N 3G6410A00131 and 3G6410A00132 for LIPS operation is not permitted.

The LIPS and FIPS configurations are treated separately: based on the considerations given on this document a configuration cleared with LIPS is not necessarily cleared with FIPS and vice-versa.

For both the LIPS and FIPS, the table below:

- includes all the ice sensitive equipments (which meet the conditions 1) and 2) of para. 4.2 of this document) positively assessed in icing conditions per the AW139 Icing Clearance Policy (ref.[1]) and not causing EMC interference (per condition 3) of para. 4.2);
- doesn't include non-sensitive equipments, or equipments with no external shapes or openings which, when installed in accordance with the approved drawings, can be considered cleared into known icing conditions (once tested for EMC interference);
- doesn't include ice sensitive equipments not cleared in icing conditions.

The first two columns include the P/N and description of the equipment.

Then the restrictions and the clearance basis (ice clearance and EMC) are reported, separated in two groups, one for the LIPS and the other for the FIPS. The restriction reported must be applied to consider the kit ice cleared. If the box is left blank no modifications are required to the equipment, which can be therefore safely installed in an ice cleared configuration.

The AW139 basic configuration here considered is the one approved at December 2009 and any modification to this configuration, as the addition of new kits or equipments, if considered "ice sensitive", has to be cleared following the Icing Clearance Policy ref.[1].



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P/N	KIT DESCRIPTION	LIPS		FIPS	
		RESTRICTION	CLEARANCE	RESTRICTION	CLEARANCE
3G2121F00111	Forced ventilation	Installation P/N 4G3020A00411 (forward cowling) to be considered if ECS kit is required.	YES	Installation P/Ns 4G3020A00211 (forward cowling) and 4G6320F00211 (AGB kit) to be considered if ECS kit is required.	YES
3G2140F00111	Heating		YES		YES
3G2140F00112	Forced ventilation and heating		YES		YES
3G2140F00211	Air conditioning		YES		YES
3G2140F00311			YES		YES
3G2141F00111			YES		YES
3G2141F00113			YES		YES
3G2141F00114			YES		YES
3G2141F00311			YES		YES
3G2150F00111			YES		YES
3G2150F00112			YES		YES
3G2150F00113			YES		YES
3G2150F00114			YES		YES
3G2150F00211			YES		YES
3G2150F00311			YES		YES
3G2150F00411			YES		YES
4G2150F00711	Air Conditioning (Enviro, standard)				NO
4G2150F00911	Air Conditioning (Enviro, dual zone)		NO	AGB kit P/N 4G2150F00811 required.	YES
4G3040F00111	Windshield wipers-washing		YES		YES
4G3040F00113			YES		YES
4G3040F00114			YES		YES
4G3040F00116			YES		NO
4G3360F02611			YES		YES
3G2350F00211	External loudspeakers		NO		YES
4G2350F00511			NO		YES
4G2350F00611			YES		YES
3G2592F00111	Cargo hook		YES		YES
3G2592F00112			YES		YES

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P/N	KIT DESCRIPTION	LIPS		FIPS	
		RESTRICTION	CLEARANCE	RESTRICTION	CLEARANCE
3G9770F00111	Cargo hook camera		YES		YES
3G3271F00111	Snow skids		YES		YES
3G3271F00112			YES		YES
3G3272F00111	Slump protection pads		YES		YES
3G3272F00112			YES		YES
4G3340F00411-2	Strobe lights (winglets)		YES		YES
4G3340F00413			NO		YES
3G3450F00311	TCAS		NO		YES
3G3450F00312			NO		YES
3G3450F00411	GPS		NO		YES
3G5260F00111	Pilots footsteps		YES		YES
3G5260F00112	Passengers footsteps		YES		YES
3P5260F00211			YES		YES
4G5260F00411			YES		YES
4G5280F00111	Nose landing gear doors		YES		YES
4G5280F00112			YES		YES
3G5260F00211-9	Foldable passengers footsteps		YES		YES
4G5260F00512	SAR Protection Pilot-Pax Footstep		YES		YES
4G5260F00711	Protection Sponson for Footstep		YES		YES
4G5260F00811			YES		YES
4G5260F00312	Kit Fast Removable Footstep		YES		YES
4G5260F00111-3	SAR Protection Step		YES		YES
4G5212F00111	Passenger hinged doors		YES		YES
4G5630F00211	Copilot hinged windows		YES		YES
4G5620F00111	Cabin bubble window		YES		YES
4G9554F00111	Wire strike protection system		YES		YES
4G9540F00211			YES		YES
4G9540F00212			YES		YES
4G9540F00312			YES		YES

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P/N	KIT DESCRIPTION	LIPS		FIPS	
		RESTRICTION	CLEARANCE	RESTRICTION	CLEARANCE
3G9560F00113	Emergency floats		YES		YES
3G3440F00111	2 nd Radar Altimeter RT300		YES		YES
3G3440F00211	EGPWS		YES		YES
4G2310F01311	SAT/COM Skytrac ISAT-100		NO		YES
4G2310F03011	SAT/COM Skytrac ISAT-200		YES		YES
3G2591F00111-3	External hoist Breeze		YES		YES
3G3340F00111	Search light SX16		NO		YES
4G3340F01811	2 nd additional landing light (NVG)		NO		YES
4G3450F00611	2 nd GPS		NO		YES
3G2310F00411	SAT/COM		NO		YES
3G3450F00511-4	2 nd Transponder		NO		YES
3G3450F00515-8	2 nd Transponder ADS-B OUT		NO		YES
4G9750F00211-3	External video camera		YES		YES
4G3340F01812	2 nd Additional Landing Light (no NVG)		NO		YES
4G3340F02611	Landing Lights Sirio Panel		YES		YES
4G9750F00312	Max Viz under fuselage		NO		YES
4G1830F00211	AVCS		NO		YES
4G9810F00111-4	Lightning Sensor System		NO		YES
4G3450F00111	2 nd DME		NO		YES
4G3340F02311	Lighting External Area		YES		YES
4G2591F00111	Dual Rescue Hoist Goodrich	Installation of hoist fairing is required, per instl. drawing P/N 3G5306P38111-2	YES	Installation of hoist fairing is required, per instl. drawing P/N 3G5306P38111-2	YES
4G2591F00211	Single Rescue Hoist Goodrich		NO	Installation of hoist fairing is required, per instl. drawing P/N 3G2591P00111	YES
4G3340F02111	Hoist Light (Sirio Panel/Goordich)		YES (*)		YES
4G2310F01111	SAT/COM Sky Connect Flightdeck		NO		YES
4G2310F02411	NAT NPX 138		YES		YES

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P/N	KIT DESCRIPTION	LIPS		FIPS	
		RESTRICTION	CLEARANCE	RESTRICTION	CLEARANCE
4G3450F00311	DF 935-2		NO		YES
4G3450F00711	DF 935-11		YES		YES
4G9350F00113	FLIR (Seaflir II)		NO		YES
4G3340F02220-5	SX16 Steer LDG LTS RS232 NVG		NO		YES
3G2560F00311-2	ELT deployable		YES		YES
3G9560F00111	Emergency floats and life rafts		NO		YES
4G3340F00211	Enhanced landing lights		NO		YES
3G2310F00111	V-UHF Flexcomm II		YES		YES
3G2310F00211	Radio Honeywell HF-1050		YES		YES
3G2310F00212			YES		NO
3G2310F00411-4	SAT/COM Aircell VIP		NO		YES
4G3130F00111-3	HUMS		YES		YES
4G3340F00611	2 nd Anti-collision light		YES		YES
4G3340F00612			YES		YES
3G3440F00212	EGPWS -030		YES		YES
3G3450F00413	GPS SBAS and FMS		YES		YES
4G3450F00613	2 nd GPS SBAS		YES		YES
4G3450F00211	TCAS II		YES		YES
4G2560F00811	Life Rafts		YES		YES
4G2560F01011	Liferafts 14 pax (Aerazur)		YES		YES
4G3340F01011-2	Main Rotor Lights		YES		YES
4G3340F01111-3	Tail Rotor Lights		YES		YES
4G3340F02911	Tail Rotor Lights With Float. Dart		NO		YES
3G3450F00211-4	2 nd ADF		YES		YES
4G3340F02411	Trakka A800 Search Light (NVG)		NO		YES
4G3340F02413			NO		YES
4G3340F02412			YES		YES
4G3340F02414			YES		YES
4G9350F00712	FLIR Ultraforce 350 EP		NO		YES

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P/N	KIT DESCRIPTION	LIPS		FIPS	
		RESTRICTION	CLEARANCE	RESTRICTION	CLEARANCE
4G9760F00111	Hoist Camera (Double Goodrich)		YES (*)		YES
4G3340F01311	Searchlight NIGHTSUN II XP		NO		YES
4G3441F00311	Radar Telephonics RDR-1500B+	Installation of the tucano nose P/N 3G5240A00117 cleared for icing.	YES	Installation of the tucano nose P/N 3G5240A00117 cleared for icing.	YES
4G9350F00211	FLIR Safire HD		YES		YES
4G9350F01011	FLIR LEO III HD		NO		YES
4G3450F00416	AIS Trasponder		YES		YES
3G9560F00212	Emergency Floats (AERAZUR)		YES		YES
4G2310F02912	Radio TETRA CHELTON CH-150		YES		YES
4G2350F02111	External Loudspeakers 900W		NO		YES
4G9350F01111	FLIR Safire 380HDc		YES		YES
4G9360F00211	Obstacle Proximity Lidar System (OPLS)		YES		YES
4G4390F00411	SAT/COM Flightcell DZMx		YES		NO
4G4390F00811	SAT/COM Flightcell DZMx (4G)		YES		NO
4G4390F01111	SAT/COM Flightcell DZMx (4G-WIFI)		NO		YES
4G9380F00111	Power Line Detector		YES		NO
4G2350F02312	Polycon NG		YES		YES
4G2310F07411	Provision Double Radio Sepura		YES		YES
4G5212F00311	External Rigid Handle		YES		YES

NOTE:

(*) kits considered compatible as the ambient conditions, when the hoist is operated, are outside of the icing envelope permitted for LIPS usage.

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