



U.S. Department of Transportation
Federal Aviation Administration
Washington, DC

Operational Suitability Report (OSR)

Revision: 3
Date: 08/14/2020

Operational Credit for Enhanced Flight Vision Systems (EFVS)

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RECORD OF REVISIONS

Revision Number	Sections	Date	Administrator
0 (Original)	All	07/02/2018	C. McLellan
1	1, 2, 3, 4, 5, and Appendix 1	08/22/2018	C. McLellan
2	All	01/31/2020	C. McLellan
3	All	08/14/2020	C. McLellan

HIGHLIGHTS OF CHANGE

0. Original Document; all Sections.
1. Changed “EFVS Minimum Visibility” to “Minimum Visibility for Use with EFVS” throughout Sections 1-3, deleted paragraph 3.2, changed values in table in Section 5 from fractions to percentages, added part 129 to lists of affected operators, and added Kollsman EVS-SP, Kollsman EVS-II, and Kollsman EVS-I system performance information to Appendix 1.
2. Removed content from Sections 1-6 that had a potential to conflict with the efforts of the Aircraft Certification Service to standardize the methodology for quantifying visual advantage. Updated recommendations for EFVS operational credit to include recommendations for Collins EVS-3000, Collins EVS-3600, CMC CMA-2600, CMC CMA-2700, and Elbit/Universal Avionics EVS5000. Updated EVS-II aircraft installations to include MD-11, MD-10, B-777, B-767, and B-757. Added Appendix 2 about collecting feedback from pilots conducting EFVS operations and Appendix 3 about potential aircraft and EFVS sensor combinations.
3. Removed content in Sections that is expected to be included in advisory circular (AC) revisions. Updated Appendix 1 recommendations for CMA2700 and EVS-3600. Added references to Flight Test Reports, when applicable. Moved prior Appendix 2 to Appendix 4, and moved prior Appendix 3 to Appendix 2. Added Appendix 3, which includes tables of operational credit for reference.

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1. PURPOSE.

This Operational Suitability Report (OSR) supports the authorization of *EFVS operational credit* in Operations Specification (OpSpec) C048, Enhanced Flight Vision System Operations, and contains recommendations for EFVS operational credit provided by the Flight Technologies and Procedures Division.

Note: The Flight Technologies and Procedures Division reserves responsibility and authority to evaluate test results and modify sections of this report. Direct questions, comments, and change proposals about this document to the Flight Technologies and Procedures Division.

2. AUDIENCE.

2.1 Federal Aviation Administration (FAA) aviation safety inspectors (ASI) evaluating applications for OpSpec C048 that authorize provisions using *EFVS operational credit* in Title 14 of the Code of Federal Regulations (14 CFR) part 121, 125, 129, or 135 operations.

2.2 Persons preparing an application for OpSpec C048 seeking an FAA authorization to utilize provisions for *EFVS operational credit* in part 121, 125, 129, or 135 operations.

2.3 Other persons conducting EFVS operations who may benefit from demonstrated system performance data.

3. CONTACT.

The Flight Technologies and Procedures Division EFVS Focal Point may be contacted via the following email to answer any questions about EFVS operational policy or the recommendations made in this OSR. The EFVS Focal Point Email is 9-AVS-AFS-EFVS@faa.gov

4. STANDARD EFVS OPERATIONAL CREDIT.

EFVS operational credit is credit for a portion of flight visibility prescribed by the instrument approach procedure (IAP) being flown that is satisfied by the enhanced image provided by the EFVS. A more detailed explanation is provided in AC 90-106, Enhanced Flight Vision Systems. The Flight Technologies and Procedures Division evaluates available performance data from numerous sources such as other operational evaluations and Original Equipment Manufacturer (OEM) demonstrations conducted in the type design approval process and recommends a standard credit for the EFVS sensor. An operator applying for EFVS operational credit that elects to use the standard credit recommended in this report would avoid the burden of demonstrating system performance in the application process for using the credit.

APPENDIX 1

EFVS SENSORS AND RECOMMENDATIONS FOR OPERATIONAL CREDIT

This appendix documents the recommendations of the Flight Technologies and Procedures Division for selecting EFVS operational credit in OpSpec C048 for installed EFVS sensors.

The recommendations are based on data provided to the Flight Technologies and Procedures Division. If an installed EFVS sensor is not included in this report, no recommendation regarding that sensor is available. The Flight Technologies and Procedures Division may revise these recommendations based on the receipt of additional sensor performance data.

Note: The recommendations in this report are typically based on demonstrations of performance conducted on IAPs and runways utilizing incandescent lights. The same operational credit applies regardless of lighting technology, however the system performance may differ when conducting EFVS operations at airports using light-emitting diodes (LED) in approach or runway lighting. Therefore, pilots should be aware of the lighting technology used at the airport in which they are conducting EFVS operations and may experience a difference in performance of the EFVS sensor, which could affect the ability to continue the approach.

EFVS Sensors

Kollsman EVS-SP (EVS-III)
Recommended EFVS Operational Credit: 33%
Applicable Installations: See Appendix 2
Basis for the Recommendation: Gulfstream Flight Test Data

Kollsman EVS-II
Recommended EFVS Operational Credit: 33%
Applicable Installations: See Appendix 2
Basis for the Recommendation: Gulfstream Flight Test Data

Kollsman EVS-I
Recommended EFVS Operational Credit: 25%
Applicable Installations: See Appendix 2
Basis for the Recommendation: The recommendation for the EVS-I sensor is based on operational data provided to the Flight Technologies and Procedures Division that is not consistent with current visual advantage performance testing criteria, but was sufficient to justify operational credit.

Elbit/Universal Avionics EVS5000
Recommended EFVS Operational Credit: 33%
Applicable Installations: See Appendix 2
Basis for the Recommendation: Dassault Aviation Report DGT168876

Collins EVS-3600
Recommended EFVS Operational Credit: 33%
Applicable Installations: See Appendix 2
Basis for the Recommendation: Collins Aerospace Report 946-27A0-001 and Bombardier Aerospace Letter to NY ACO Ref BD700/M170/A-1/0362

CMC CMA-2700
Recommended EFVS Operational Credit: 33%
Applicable Installations: See Appendix 2
Basis for the Recommendation: Bombardier Global 5000/6000 Flight Test Data

Collins EVS-3000, CMC CMA-2600
Recommended EFVS Operational Credit: Not applicable. Additional flight test data is required to determine the recommended EFVS operational credit percentage.
Applicable Installations: See Appendix 2
Basis for the Recommendation: The Flight Technologies and Procedures Division did not receive or evaluate visual advantage performance data for these sensors prior to the publication of this report.

APPENDIX 2

AIRCRAFT AND EFVS COMBINATIONS

This appendix contains information regarding potential aircraft and EFVS sensor combinations. The tables are advisory only and do not replace the information found in an operator’s Airplane Flight Manual (AFM)/Airplane Flight Manual Supplement (AFMS). The information was compiled via a combination of analysis of existing OpSpec/Management Specification (MSpec)/Letter of Authorization (LOA) C048 authorizations, online research, and communication with individuals from industry. Please contact the Flight Technologies and Procedures Division EFVS Focal Point with any aircraft and EFVS combination that is not listed in the tables below.

Boeing			
Aircraft	EFVS		Remarks
	Manufacturer	Model	
B737	Collins Aerospace	EVS-3600	Collins STC ST02522SE
B757	Kollsman	EVS-II	FedEx STC
B767	Kollsman	EVS-II	FedEx STC
B777	Kollsman	EVS-II	FedEx STC
MD-10	Kollsman	EVS-II	FedEx STC
MD-11	Kollsman	EVS-II	FedEx STC

Bombardier			
Aircraft	EFVS		Remarks
	Manufacturer	Model	
BD-700-1A10 (Global Express/XRS)	Esterline CMC	SureSight CMA-2600	
BD-700-1A10 (Global 6000)	Esterline CMC	SureSight CMA-2700	
BD-700-1A11 (Global 5000)	Esterline CMC	SureSight CMA-2600	Honeywell Flight Deck
BD-700-1A11 (Global 5000)	Esterline CMC	SureSight CMA-2700	Vision Flight Deck
CL-600-2B16 (Challenger 604/605/650)	Esterline CMC	SureSight CMA-2700	
BD-700-2A12 (Global 7500)	Collins Aerospace	EVS-3600	

Dassault			
Aircraft	EFVS		Remarks
	Manufacturer	Model	
Falcon 7X	Esterline CMC	SureSight CMA-2600	
Falcon 8X	Elbit/Universal Avionics	EVS5000 (FalconEye)	
Falcon-900	Elbit/Universal Avionics	EVS5000 (FalconEye)	
Falcon-900	Esterline CMC	SureSight CMA-2600	
Falcon-2000	Elbit/Universal Avionics	EVS5000 (FalconEye)	
Falcon-2000	Esterline CMC	SureSight CMA-2600	

Embraer			
Aircraft	EFVS		Remarks
	Manufacturer	Model	
EMB-550	Rockwell Collins	EVS-3000	

Gulfstream			
Aircraft	EFVS		Remarks
	Manufacturer	Model	
G280	Kollsman	EVS-II	
G-IV	Kollsman	EVS-I	
G-V	Kollsman	EVS-I	
GIV-X (G450)	Kollsman	EVS-I	Prior to N4142
GIV-X (G450)	Kollsman	EVS-II	N4142 and beyond
GV-SP (G550)	Kollsman	EVS-I	Prior to N5214
GV-SP (G550)	Kollsman	EVS-II	N5214 and beyond
G-VI (G650/650ER)	Kollsman	EVS-II	
G-VII (G500/G600)	Kollsman	EVS-III (SP)	

APPENDIX 3

EFVS OPERATIONAL CREDIT TABLES

The tables in this appendix represent the tables in OpSpec C048 for parts 121, 125, and 135 operators that have been authorized to use EFVS operational credit.

Note: Parts 91 and 91K operators may find the information in these tables beneficial. Although operational credit is not necessary when operating under part 91 rules, the recommendations in Appendix 1 and the tables in Appendix 3 may be useful in approach planning.

Determining IAP Visibility Minimums with EFVS (RVR)

Visibility Required Without the Use of EFVS	25% Reduction Minimum Visibility with the Use of EFVS	33% Reduction Minimum Visibility with the Use of EFVS	50% Reduction Minimum Visibility with the Use of EFVS
1400	1100	1000	1000
1800	1400	1200	1000
2000	1500	1300	1000
2200	1700	1500	1100
2400	1800	1600	1200
2600	2000	1700	1300
3000	2300	2000	1500
3500	2600	2300	1800
4000	3000	2700	2000
4500	3400	3000	2300
5000	3800	3400	2500
5500	4100	3700	2800
6000	4500	4000	3000

Determining IAP Visibility Minimums with EFVS (Statute Miles)

Visibility Required Without the Use of EFVS	25% Reduction Minimum Visibility with the Use of EFVS	33% Reduction Minimum Visibility with the Use of EFVS	50% Reduction Minimum Visibility with the Use of EFVS
1/2	3/8	1/4	1/4
5/8	1/2	3/8	3/8
3/4	1/2	1/2	3/8
7/8	5/8	1/2	1/2
1	3/4	5/8	1/2
1 1/8	1	3/4	5/8
1 1/4	1	3/4	5/8
1 3/8	1	1	3/4
1 1/2	1 1/8	1	3/4
1 5/8	1 1/4	1	3/4
1 3/4	1 3/8	1 1/8	7/8
1 7/8	1 3/8	1 1/4	1
2	1 1/2	1 3/8	1
2 1/2	1 7/8	1 1/2	1 1/4
3	2 1/4	2	1 1/2

APPENDIX 4

EFVS PERFORMANCE FEEDBACK

The FAA is interested in collecting feedback from pilots conducting EFVS operations.

The information will be used to evaluate the effectiveness of operational concepts as well as to identify areas where EFVS operational credit can be expanded.

The FAA Civil Aerospace Medical Institute (CAMI) developed a tablet application to allow pilots to input data related to the EFVS operation and database to store, consolidate, and filter the information for future analysis. Pilots with the application downloaded on their tablets will be able to easily transmit information about their experience during an EFVS operation to the database.

Sample Tablet Application

The screenshot displays the 'Cloud-based Testing Operations Performance Synergies at CAMI' interface. At the top, it features logos for the Federal Aviation Administration, the FAA Civil Aerospace Medical Institute (CAMI), and the EFVS logo. The current time is shown as UTC: 14:56:00 and Local: 10:56:00. The form includes several sections: 'Airport ID' with a checked box for 'KDCA' and a 'Clear' link; 'Landing Time / Approach Time' with a checked box for 'UTC: Oct 04 14:53' and a 'Clear' link; 'Aircraft Type' with a dropdown menu; 'Type of Ops.' with a checked box for 'Part 121' and a 'Clear' link; 'Approach procedure used' with a checked box for 'ILS OR LOC RWY 01' and a 'Clear' link; 'Published RVR or Visibility minimums used' with a checked box for '1400 ft' and a 'Clear' link; and a status selection with a checked box for 'Landed' and a 'Missed Approach' button with a 'Clear' link. A 'Reason for missed approach' dropdown and a 'Missed approach remarks' text area are also present. At the bottom, there are 'Reported' and 'Observed' buttons, with a question mark icon next to 'Observed'. A disclaimer and a Jeppesen chart are visible on the right side of the screen.

Although participation is voluntary, the FAA hopes that EFVS users will recognize the mutual benefits of collecting such information since any one pilot might experience only a few EFVS operations annually. Thus, a collective effort by all EFVS users will provide meaningful data to be used in future operational credit policy development.

Pilot and operator information is kept confidential. If you are interested in participating, please contact the Flight Technologies and Procedures Division EFVS Focal Point at (202) 267-4363.