IEEE C37.100.1 Working Group
Meeting Minutes
Web Meeting (Reno, NV Canceled)
October 13th, 2021

1. Welcome

The meeting was called to order by Chairman John Webb, by the Chairman at 10:16 AM CT. The Chairman welcomed everyone both guest and working group members.

2. Introduction of members and guests

The chair requested all attendees to introduce themselves in the meeting chat including both name and affiliation 32 of 40 working group members and 57 guests were in attendance. Quorum was met. Guest Hua Liu asked to move to membership status going forward.

3. IEEE-SA Patent Policy

The Chairman reminded attendees that the IEEE copyright slides and IEEE patent policy slides were provided with the meeting invitation and thus would not be presented in detail absent a request to review. The chair called for any knowledge of essential patents required to implement the standard, no claims or issues were raised this meeting.

4. Approval previous meeting minutes and meeting agenda

Eldridge Byron motioned, and Karla Trost seconded the motion to approve the meeting minutes from the Fall, 2020 meeting minutes shared on the screen. It was noted that voting members of the working group shown in the presentation numbered 38, but the claimed number of voting members was listed as 40, with a quorum of 20, when on the surface it would appear 19 would constitute a quorum. Because the higher limit of 20 was verified as present, the Chair decided to investigate the discrepancy and make corrections as needed.
[Subsequent investigation showed that of the 40 voting members claimed 2 were honorary members of the main committee and active voting members in the working group and were erroneously omitted from the displayed list. The correct number for quorum was 20].

5. Discussion Topics

- iMeetCentral to be Project Repository & Coordination. Members and guests were reminded to ensure their participation in the IEEE iMeetCentral system was active. [https://ieee-sa.centraldesktop.com]
- Task Force Reports
  - Gas Tightness – Stone / Jain / Trost / Hensberger
    - Gas Tightness task force have not held meeting
    - Eldridge Byron joined Task force
  - Testing & Tolerances – DeCesaro / Reigart / Webb
    - Frank DeCesaro presented the Task Force report
    - Frank DeCesaro volunteered to create and submit testing table
  - Altitude Correction Factor – Rosker / Bergman / Reigart / Schiffbauer

- Ian Rosker Presented the Task Force report (attached)
- Carl Reigart shared history of issues with Altitude Correction HV switches
- Task Force made the recommendation to the historical Altitude Correction, Eldridge Byron 2nd motion.
- The Working group voted without abstention or objection to use the historical altitude correction curve.

- The topic of placement of test in the production test vs routine test was discussed. The Chairman that any formal proposals for any changes on this were welcome and would be reviewed with the working group.

6. Next steps

The Chairman asked for volunteer reviewers to help with updates for possible draft to circulate with working group before next meeting. The next planned meeting of the working will be at the Spring 2021 meeting in Orlando, FL, however a virtual meeting may be held if comments on the initial draft of the standard warrant it.

7. Adjourn

The meeting was adjourned by the Chairman at 11:29 CT.

Attachments: (1) Meeting Attendance & Membership
(2) Altitude Correction Factors TF Presentation

Reported by Russell Boyce, secretary of C37.100.1 Working Group

Subgroup	Name	Role	Pref. Name	Last Name	Company	City	State	5/6/2020	10/7/2020	4/21/2021	10/13/2021
1	C37.100.1	Chair	John	Webb	ABB	Pawleys Island	SC	X	X	X	X
1	C37.100.1	Secretary	Russell	Boyce	Eaton	Greenwood	SC	X	X	X	X
1	C37.100.1	Member	Chris	Ambrose	Federal Pacific (Div. of Electro-Mechanical Co	Bristol	TN	X	X	X	X
1	C37.100.1	Member	Paul	Barnhart	Underwriters Laboratories	Walkertown	NC	X			
1	C37.100.1	Member	Bill	Bergman	Bergman& Associates Ltd.	Calgary	AB		X	X	X
1	C37.100.1	Member	Anne	Bosma	Hitachi Energy	Ludvika	Other	X	X		X
1	C37.100.1	Member	Dan	Busilan	Dominion Energy	Richmond	VA		X	X	X
1	C37.100.1	Member	Eldridge	Byron	Schneider Electric	Smyrna	TN	X			X
1	C37.100.1	Member	Randy	Creach	AZZ Switchgear Systems	Holts Summit	MO	X	X	X	X
1	C37.100.1	Member	Frank	DeCesaro	DeCesaro Consulting Services	Racine	WI	X	X	X	X
1	C37.100.1	Member	Federico	Di Michele	CESI S.p.A.	Milano	Other	X	X		X
1	C37.100.1	Member	Sergio	Flores	Schneider Electric Inc. USA	SMYRNA	TN	X	X		X
1	C37.100.1	Member	Paul	Gingrich	AZZ Switchgear Systems	Fulton	MO	X			
1	C37.100.1	Member	Dave	Gohil	AZZ Switchgear Systems	Venice	FL	X	X	X	X
1	C37.100.1	Member	Jack	Harley	FirstPower Group LLC	Twinsburg	OH	X	X	X	X
1	C37.100.1	Member	Ron	Hartzel	Eaton Corporation	Moon Township	PA	X			X
1	C37.100.1	Member	Bill	Hurst	GE	Charleroi	PA	X	X	X	X
1	C37.100.1	Member	Neil	Hutchins	Georgia Power Company	Forest Park	GA	X	X	X	
1	C37.100.1	Member	Rahul	Jain	S&C Electric Company	Chicago	IL	X	X	X	X
1	C37.100.1	Member	Chris	Jarnigan	Southern Company Services	Birmingham	AL		X	X	X
1	C37.100.1	Member	John	Kaminski	Siemens	Mount Prospect	IL	X	X	X	X
1	C37.100.1	Member	Andy	Keels	kEElectric Engineering	Mesa	AZ			X	
1	C37.100.1	Member	Amir	Khosravi	BC Hydro	Burnaby	BC	X		X	
1	C37.100.1	Member	Scott	Lanning	S&C Electric	Libertyville	IL	X		X	
1	C37.100.1	Member	Brad	Leccia	Eaton	Moon Township	PA		X	X	X
1	C37.100.1	Member	Bill	Long	Retired	Pittsburgh	PA			X	X
1	C37.100.1	Member	Neil	McCord	KEC Precision	Athens	GA	X	X		X
1	C37.100.1	Member	Pete	Meyer	S&C Electric Company	Chicago	IL	X	X	X	X
1	C37.100.1	Member	Carl	Reigart	CDR Technical Services, LLC	Leeds	AL	X	X	X	X
1	C37.100.1	Member	Tony	Ricciuti	Eaton Corporation	Moon Township	PA	X	X	X	X
1	C37.100.1	Member	Ian	Rokser	Eaton Corp	South Milwaukee	WI	X	X	X	X
1	C37.100.1	Member	Garett	Sims	Eaton Corp.	Greenwood	SC	X			X
1	C37.100.1	Member	Ryan	Stone	Mitsubishi Electric Power Products, Inc.	Warrendale	PA	X		X	X
1	C37.100.1	Member	Karla	Trost	G&W Electric	Bolingbrook	IL	X	X	X	X
1	C37.100.1	Member	Jim	van de Ligt	Spark Power Corp.	Calgary	AB	X	X	X	X
1	C37.100.1	Member	Adam	Voyles	Ameren	St. Louis	MO		X	X	X
1	C37.100.1	Member	Matt	Westerdale	Bureau of Reclamation	Denver	CO	X	X	X	X
1	C37.100.1	Member	Torsten	Wirz	ABB AG	Ratingen	Other	X	X	X	
1	C37.100.1	Member	Terry	Woodyard	Siemens Industry Inc.	Wendell	NC	X		X	X
1	C37.100.1	Member	Danish	Zia	UL LLC	Melville	NY	X			
1	C37.100.1	Guest	Peter	Agliata	Hubbell Power Systems	Birmingham	AL				X
1	C37.100.1	Guest	Edwin	Almeida	Southern California Edison	Westminster	CA				X
1	C37.100.1	Guest	Mauricio	Aristizabal	Hitachi ABB Power Grids	Pittsburgh	PA	X	X	X	
1	C37.100.1	Guest	Roy	Ayers	Nashville Electric Service	Nashville	TN		X		
1	C37.100.1	Guest	Hank	Ballard	Hubbell Power Systems	Birmingham	AL		X		
1	C37.100.1	Guest	Stan	Billings	retired	Murrysville	PA		X		X
1	C37.100.1	Guest	Wally	Binder	WBBinder Consultant	New Castle	PA		X		
1	C37.100.1	Guest	Antone	Bonner	PAS Consulting	Oconomowoc	WI				
1	C37.100.1	Guest	Steve	Brown	Allen & Hoshall	Bartlett	TN		X		
1	C37.100.1	Guest	Arben	Bufi	Meiden America Switchgear, Inc.	Gray Court	SC	X	X		
1	C37.100.1	Guest	Ted	Burse	Powell Industries, Inc	Houston	TX	X			
1	C37.100.1	Guest	Stephen	Cary	GE	Mebane	NC			X	
1	C37.100.1	Guest	Steven	Chen	Eaton Corporation	MOON TOWNSHIP	PA	X	X	X	X
1	C37.100.1	Guest	Andy	Chovanec	GE Power	Charleroi	PA	X	X	X	X
1	C37.100.1	Guest	Michael	Christian	ABB	Elon	NC				X
1	C37.100.1	Guest	Luke	Collette	Duquesne Light	Pittsburgh	PA	X	X	X	
1	C37.100.1	Guest	Tim	Cook	Pascor Atlantic	Bland	VA	X	X	X	
1	C37.100.1	Guest	Chuck	Corley	Eaton	Greenwood	SC		X		
1	C37.100.1	Guest	Mike	Crawford	Mitsubishi Electric	Cranberry Twp	PA	X			X
1	C37.100.1	Guest	Jason	Cunningham	Southern States, LLC	Suwanee	GA		X		X
1	C37.100.1	Guest	Stacey	Davies	Siemens	Brookfield	WI				X
1	C37.100.1	Guest	Daniel	Davis	JST Power	Lake Mary	FL				X
1	C37.100.1	Guest	Pat	Di Lillo	Consolidated Edison Co. of NY, Inc.	New York	NY		X	X	
1	C37.100.1	Guest	Jeff	Door	The H-J Family of Companies	High Ridge	MO	X			
1	C37.100.1	Guest	Louis	Doucet	STACE	Saint-Augustin-de-Des	QC		X	X	X
1	C37.100.1	Guest	Denis	Dufournet	Retired	Villard de Lans	Other				
1	C37.100.1	Guest	Doug	Edwards	Siemens Industry, Inc.	Wendell	NC	X			
1	C37.100.1	Guest	Chris	Ekpoudom	Southern States LLC	Hampton	GA			X	X
1	C37.100.1	Guest	Bruce	Fennell	Nashville Electric Service	Nashville	TN		X		
1	C37.100.1	Guest	Philip	Fentress	Memphis Light, Gas & Water Div	Memphis	TN		X		
1	C37.100.1	Guest	Patrick	Fischer-Carne	JST Power	Lake Mary	FL				X
1	C37.100.1	Guest	Curtiss	Frazier	Ameren	St. Louis	MO	X		X	X
1	C37.100.1	Guest	Chris	French	Eaton Corporation	Greenwood	SC	X		X	X
1	C37.100.1	Guest	Brian	Gerzeny	Powell Electrical Systems Inc	North Canton	OH	X			
1	C37.100.1	Guest	Ilya	Glinsky	Southern California Edison	westminster	CA	X			
1	C37.100.1	Guest	Lou	Grahor	Eaton Corporation	Moon Township	PA	X			

Subgroup	Name	Role	Pref. Name	Last Name	Company	City	State	5/6/2020	10/7/2020	4/21/2021	10/13/2021
1	C37.100.1	Guest	John	Hall	Tennessee Valley Authority	Chattanooga	TN	X	X		X
1	C37.100.1	Guest	Chris	Hastreiter	Eaton	South Milwaukee	WI	X		X	X
1	C37.100.1	Guest	Gary	Haynes	ABB Inc.	Elon	NC	X			
1	C37.100.1	Guest	Jeremy	Hensberger	Mitsubishi Electric Power Products Inc.	Warrendale	PA	X	X	X	
1	C37.100.1	Guest	Victor	Hermosillo	GE Grid Solutions	Charleroi	PA	X	X	X	
1	C37.100.1	Guest	Fang	Huang	AEP						X
1	C37.100.1	Guest	Todd	Irwin	GE Grid Solutions	Smithville	MO	X	X	X	X
1	C37.100.1	Guest	John	Kelly	Beureau Of Reclamation	Denver	CO	X			X
1	C37.100.1	Guest	Chad	Kennedy	Schneider Electric	Hopkins	SC	X			
1	C37.100.1	Guest	Brendan	Kirkpatrick	Southern California Edison	Westminster	CA		X	X	
1	C37.100.1	Guest	Pete	Kowalik	Cleaveland/Price Inc.	Trafford	PA				X
1	C37.100.1	Guest	Carl	Kurinko	ABB Inc.	North Huntingdon	PA		X		
1	C37.100.1	Guest	Monique	La Terreur	STACE	Quebec	QC		X		X
1	C37.100.1	Guest	Art	Leifson	ABB	Durham	NC			X	
1	C37.100.1	Guest	Wang-Pei	Li	Eaton	Horseheads	NY	X		X	
1	C37.100.1	Guest	Jane	Ling	GE	Chareleroi	PA	X	X	X	
1	C37.100.1	Guest	Alex	Lizardo Cochran	JST Power	SANFORD	FL	X		X	X
1	C37.100.1	Guest	Colby	Lovins	Federal Pacific	Bristol	VA				X
1	C37.100.1	Guest	Peter	Mapp	GE Grid Solutions	Dorval	QC				X
1	C37.100.1	Guest	Abraham	Martinez	ABB	San Luis Potosi	Other			X	
1	C37.100.1	Guest	Steve	May	Southern Company	Forest Park	GA		X	X	X
1	C37.100.1	Guest	Kevin	McGlown	JST Power	Lake Mary	FL				X
1	C37.100.1	Guest	Henning	Milnikel	Siemens	Frankfurt	Other				X
1	C37.100.1	Guest	Jeremy	Moore	Pascor Atlantic	Bland	VA	X	X	X	
1	C37.100.1	Guest	Ashley	Moran	IEEE Standards Association (IEEE-SA)	Piscataway	NJ	X			X
1	C37.100.1	Guest	Chris	Morton	Powertech Labs Inc.	Surrey	Other	X			
1	C37.100.1	Guest	Terry	Neighbours	ABB Inc.	Lake Helen	FL	X			X
1	C37.100.1	Guest	Joe	Nims	Allen & Hoshall	Nashville	TN	X			
1	C37.100.1	Guest	Pavel	Novak	Schneider Electric	Regensburg	Other			X	
1	C37.100.1	Guest	Rahul	Pawar	ABB	Lake Mary	FL				X
1	C37.100.1	Guest	Andrew	Peterson	ABB	Sanford	FL	X	X	X	
1	C37.100.1	Guest	Mark	Peterson	Xcel Energy	Denver	CO				X
1	C37.100.1	Guest	John	Phouminh	PEPCO HOLDINGS, INC.	WASHINGTON	DC		X	X	X
1	C37.100.1	Guest	Craig	Polchinski	MEPPI	Warrendale	PA				X
1	C37.100.1	Guest	Paul	Rakus	Eaton	Coraopolis	PA	X			
1	C37.100.1	Guest	Laura	Reid	Hubbell Power Systems	Chelsea	AL	X			X
1	C37.100.1	Guest	Jeff	Ricker	SCHNEIDER ELECTRIC	SMYRNA	TN				X
1	C37.100.1	Guest	Brian	Roberts	Southern States, LLC	Hampton	GA	X			
1	C37.100.1	Guest	Jon	Rogers	Siemens Energy, Inc	richland	MS	X	X		
1	C37.100.1	Guest	Rob	Ross	Cleaveland/Price	Trafford	PA				X
1	C37.100.1	Guest	Leonel	Santos	Schneider Electric	Smyrna	TN		X		
1	C37.100.1	Guest	Dan	Schiffbauer	Toshiba International Corporation	Oliver	PA	X	X	X	
1	C37.100.1	Guest	Carl	Schuetz	American Transmission Company (ATC)	Waukesha	WI				X
1	C37.100.1	Guest	Devki	Sharma	Entergy	Halifax	NS	X	X	X	X
1	C37.100.1	Guest	Sushil	Shinde	Hitachi ABB Power Grids	Mt Pleasant	PA	X	X	X	
1	C37.100.1	Guest	Mike	Skidmore	AEP	Pickerington	OH		X	X	X
1	C37.100.1	Guest	Kirk	Smith	Retired	Ithaca	NY	X	X		X
1	C37.100.1	Guest	Don	Steigerwalt	Duke Energy	Charlotte	NC	X	X	X	X
1	C37.100.1	Guest	Joe	Stemmerich							X
1	C37.100.1	Guest	Paul	Sullivan	DuPont	Cassatt	SC	X			
1	C37.100.1	Guest	Donnie	Swing	Powell Industries	Houston	TX	X	X		X
1	C37.100.1	Guest	Dragan	Tabakovic	Meramec Hubbell Power Systems	Clearwater	FL				X
1	C37.100.1	Guest	Chand	Tailor	Eaton Corporation	Greenwood	SC	X			X
1	C37.100.1	Guest	John	Tarleton	Southern States, LLC	Hampton	GA		X		X
1	C37.100.1	Guest	Jean-Marc	Torres					X		
1	C37.100.1	Guest	Vernon	Toups	Siemens	Richland	MS	X	X		
1	C37.100.1	Guest	Francois	Trichon	Schneider Electric	Saint martin d'uriage	Other	X	X	X	X
1	C37.100.1	Guest	Jeff	Ward	Doble Engineering Company	Marlborough	MA		X	X	X
1	C37.100.1	Guest	Jan	Weisker	Siemens AG	Berlin	Other	X			X
1	C37.100.1	Guest	Jerry	Wen	BC Hydro	Burnaby	Other				X
1	C37.100.1	Guest	Rich	York	Mitsubishi Electric Power Products Inc.	Pittsburgh	PA		X		X
1	C37.100.1	Guest	Mina	Youssef	Eaton Corporation	Omaha	NE	X			X
1	C37.100.1	Guest	Li Yu	Yu	EATON	Moon Township	PA	X			X
1	C37.100.1	Guest	Will	Zhang	Hitachi T&D Solutions, Inc.	Suwanee	GA	X	X	X	X
1	C37.100.1	Guest	Xin	Zhou	Eaton	Pittsburgh	PA			X	X
1	C37.100.1	Correspon	Hua	Liu	Southern California Edison	Pomona	CA			X	X
		40	**Total Members**							**Members =**	**32**
										Guests =	**57**
										Total =	**89**

IEEE C37.100.1 Task Force: Altitude Correction

Report out

October 13, 2021

Ian Rokser, Dan Schiffbauer, Carl Reigart, Bill Bergman

Background

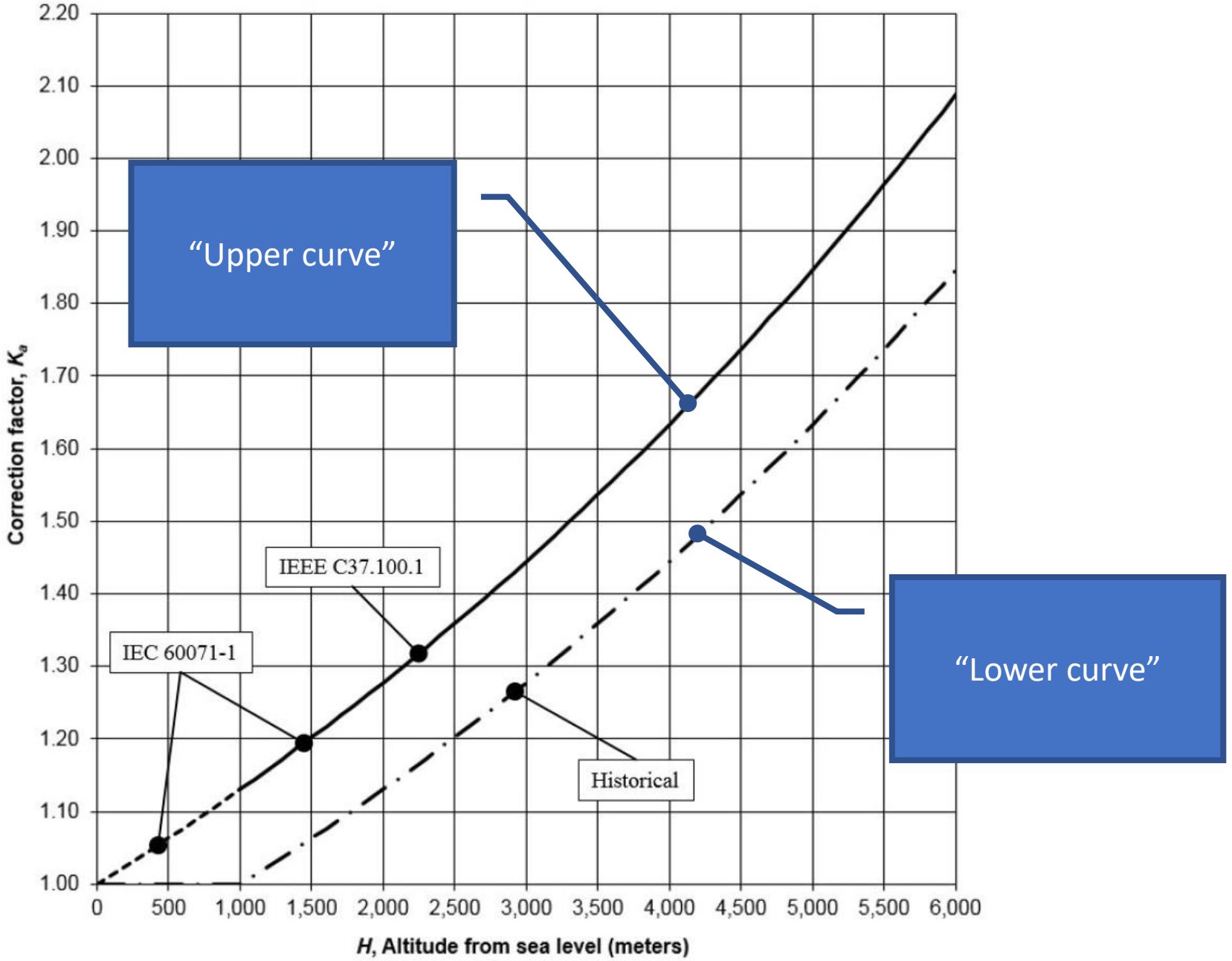


Figure B.1—Altitude correction: Three approaches for $m = 1$

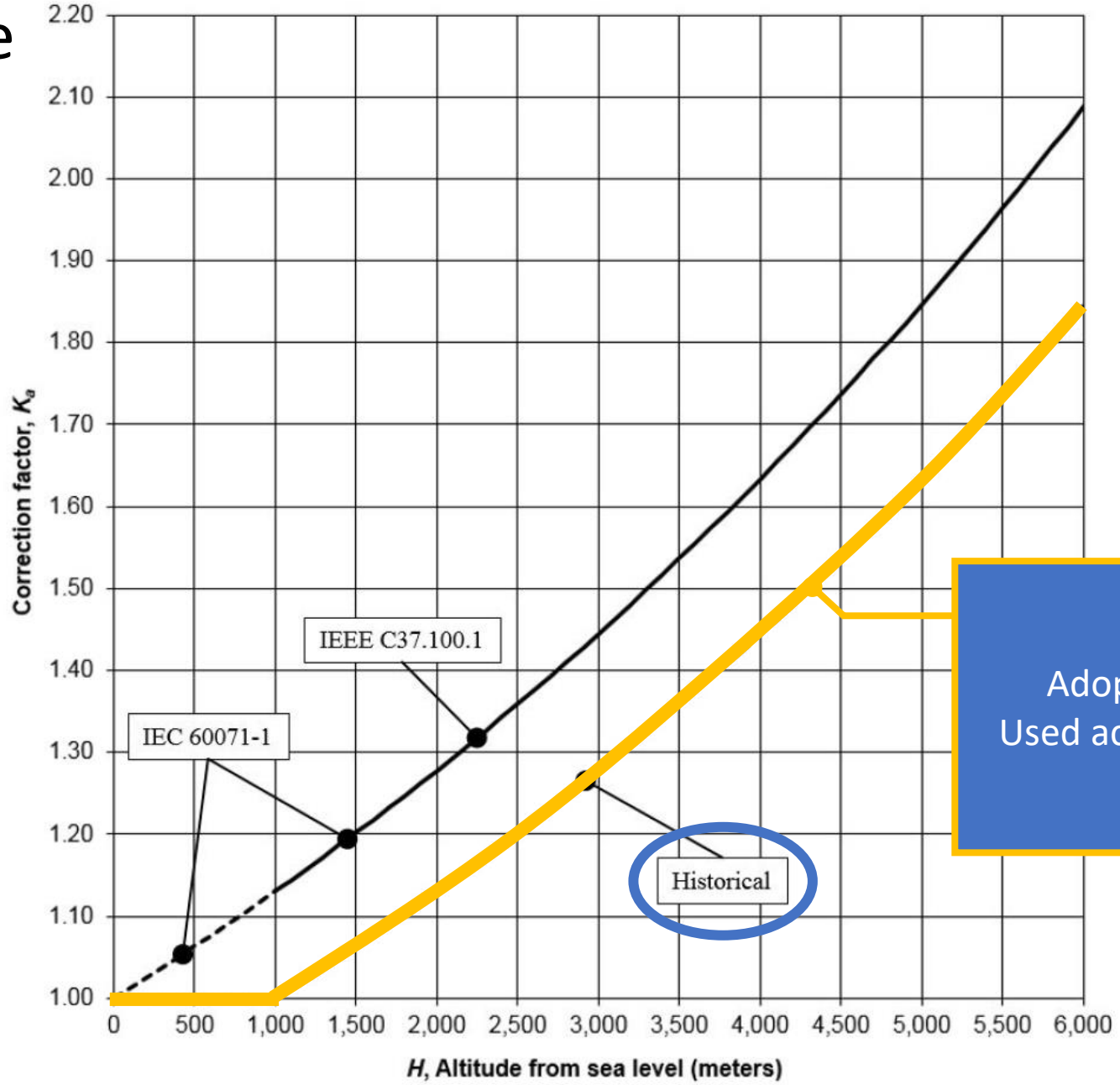
Figure from IEEE C37.100.1:2018 Annex B

How altitude correction was handled prior to 1996

- IEEE
  - Prior to 1971, any altitude correction was subject to agreement between manufacturer and user
  - IEEE released a curve in C37.30-1971 for High Voltage Switches
    - This standard used the “lower curve”
- IEC
  - Unsure when IEC 60694 first provided a curve (first ed. 1980)
  - IEC released a curve in 60694:1996 – “Common Specifications”
    - This standard used the “lower curve”

1996 perspective

1996 perspective



"Lower curve"
Adopted by IEEE C37.30-1971
Used across IEEE and in US industry until 2007

Figure B.1—Altitude correction: Three approaches for *m* = 1

Figure from IEEE C37.100.1:2018 Annex B

1996 perspective

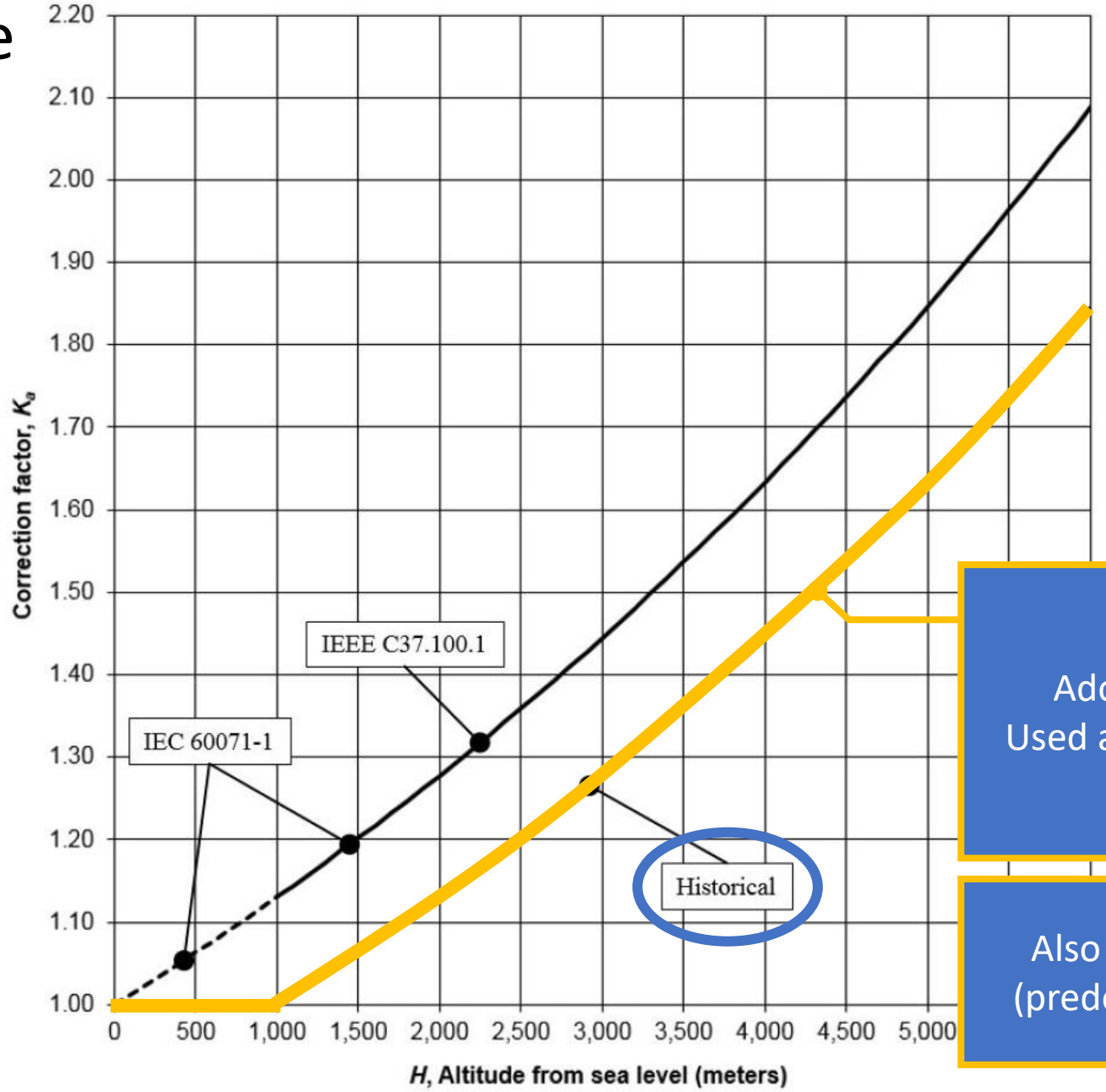


Figure B.1—Altitude correction: Three approaches for $m = 1$

"Lower curve"
Adopted by IEEE C37.30-1971
Used across IEEE and in US industry until 2007

Also adopted by IEC 60694:1996
(predecessor to IEC 62271-1:2007)

Figure from IEEE C37.100.1:2018 Annex B

1996 perspective

"Upper curve"
Adopted by IEC 60071-2:1996
Correction starts at 0m

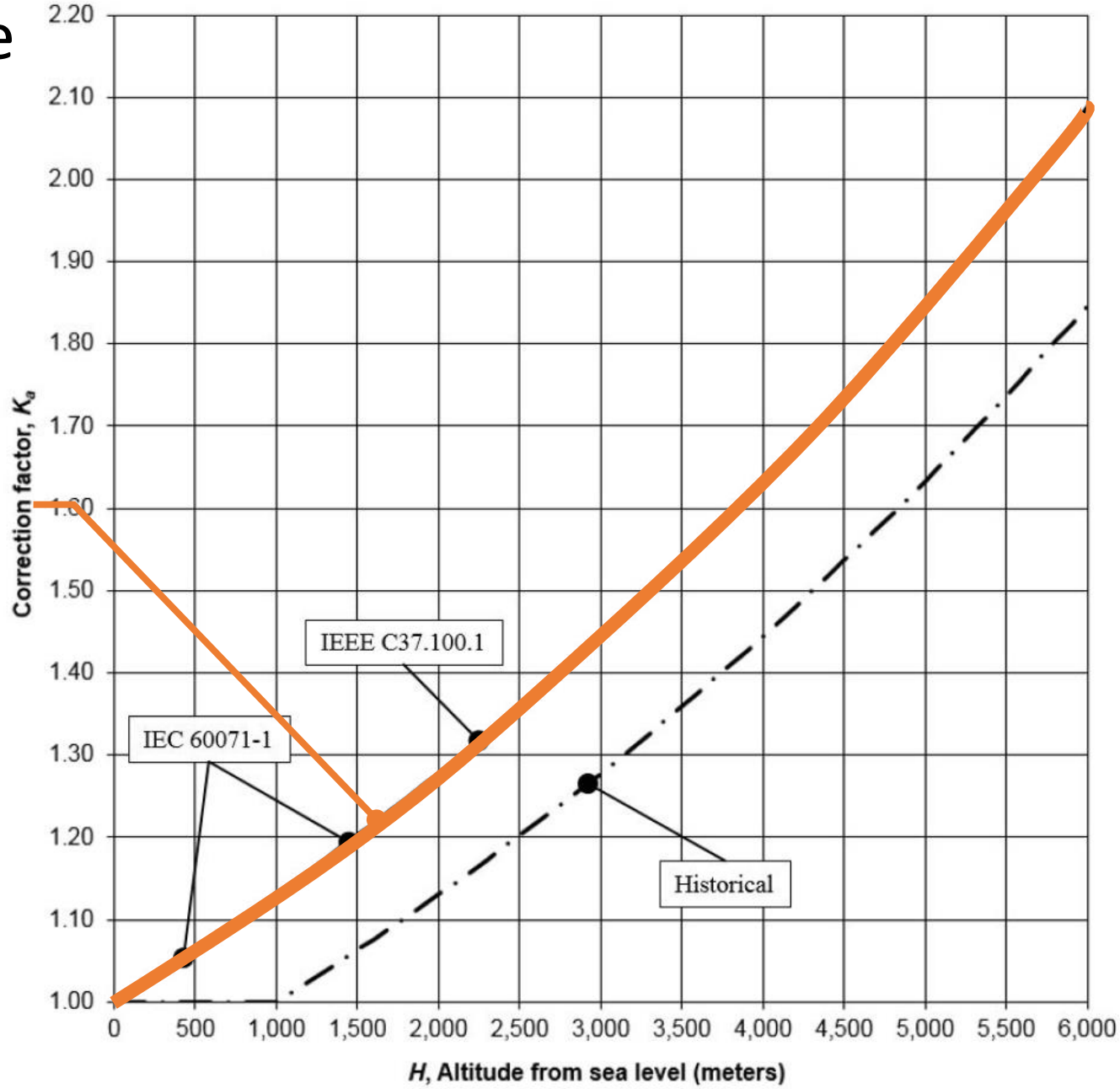


Figure B.1—Altitude correction: Three approaches for $m = 1$

Figure from IEEE C37.100.1:2018 Annex B

1996 perspective

"Upper curve"
Adopted by IEC 60071-2:1996
Correction starts at 0m

This caption is incorrect; it should say "IEC 60071-2:1996"

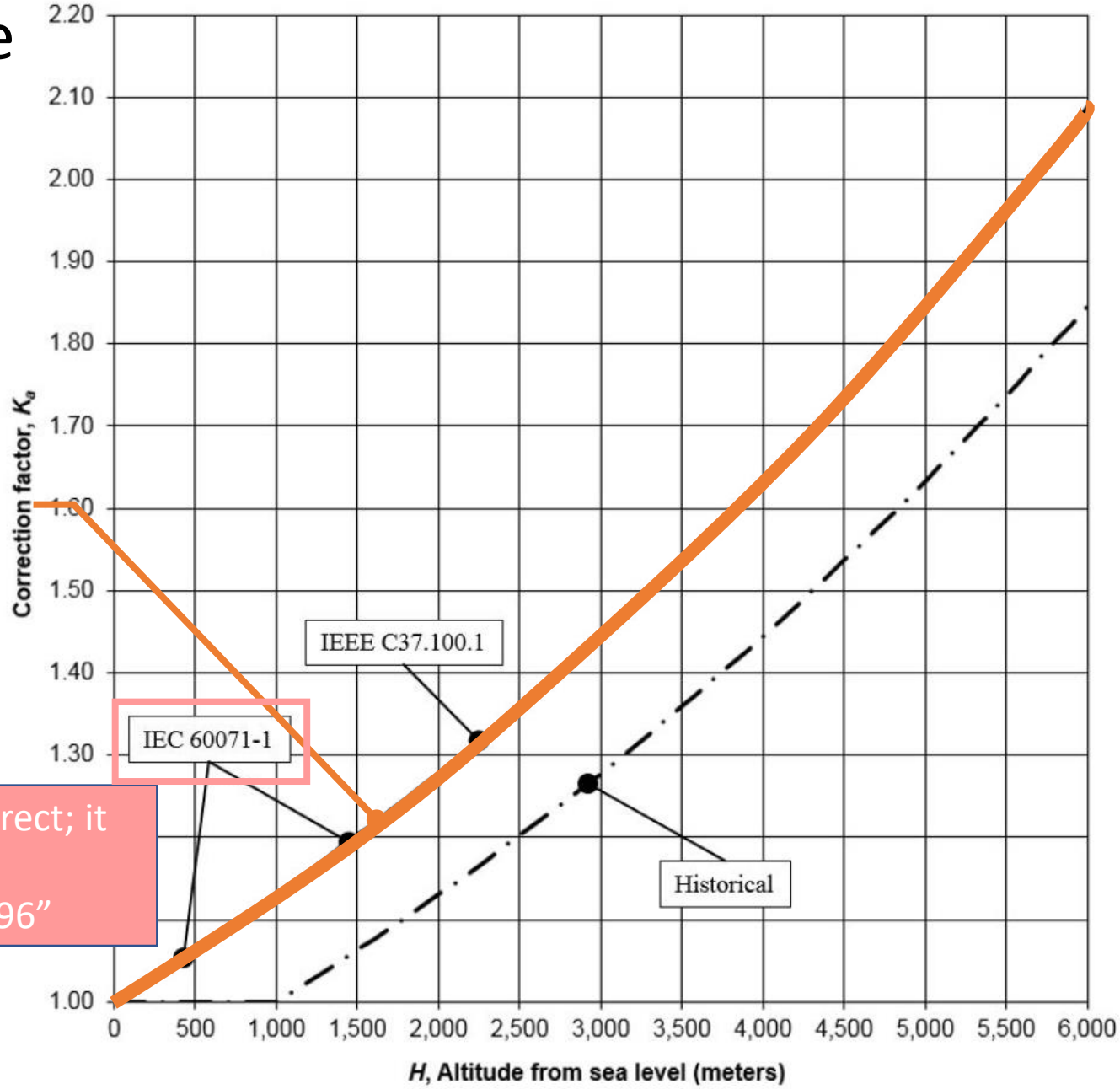


Figure B.1—Altitude correction: Three approaches for *m* = 1

Figure from IEEE C37.100.1:2018 Annex B

2007 perspective

2007 perspective

"Upper curve"
Adopted by IEC 60071-2:1996
Correction starts at 0m

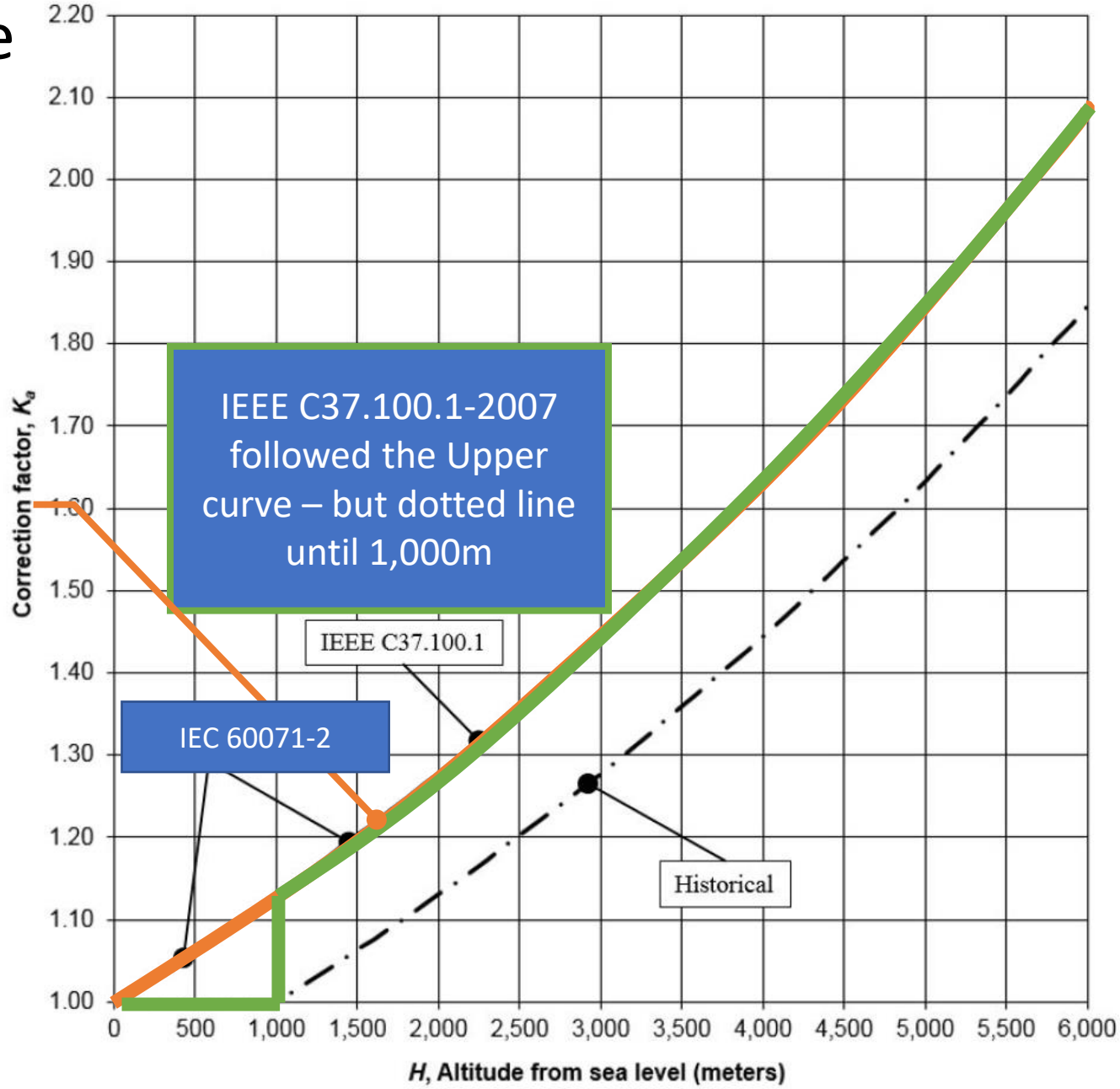


Figure B.1—Altitude correction: Three approaches for $m = 1$

Figure from IEEE C37.100.1:2018 Annex B

What we may not have realized in 2007:

IEC 60694 and 62271-1 were still using the “Lower curve” since at least 1996 – in contradiction to IEC 60071-2:1996

The IEC added Annex H to IEC 60071-2:2018 to explain the position taken by 62271-1

2021 perspective

2021 perspective

IEC 60071-2:2018 retains the upper curve but adds Annex H explaining why the lower curve can be used
IEC 62271-306:2018 gives additional explanation

Key reasons

- IEC 62271-1 (and before it, 60694) have always used the curve that starts at 1,000m
- We have excellent service history with this approach, so no need to change
- Switchgear which is properly designed for 0m application will still have sufficient margin at 1,000m (see flowchart)
- It is not practical to correct below 1,000m and not logical to jump at 1,000m
    - Not ignoring the physics but considering practicality and experience

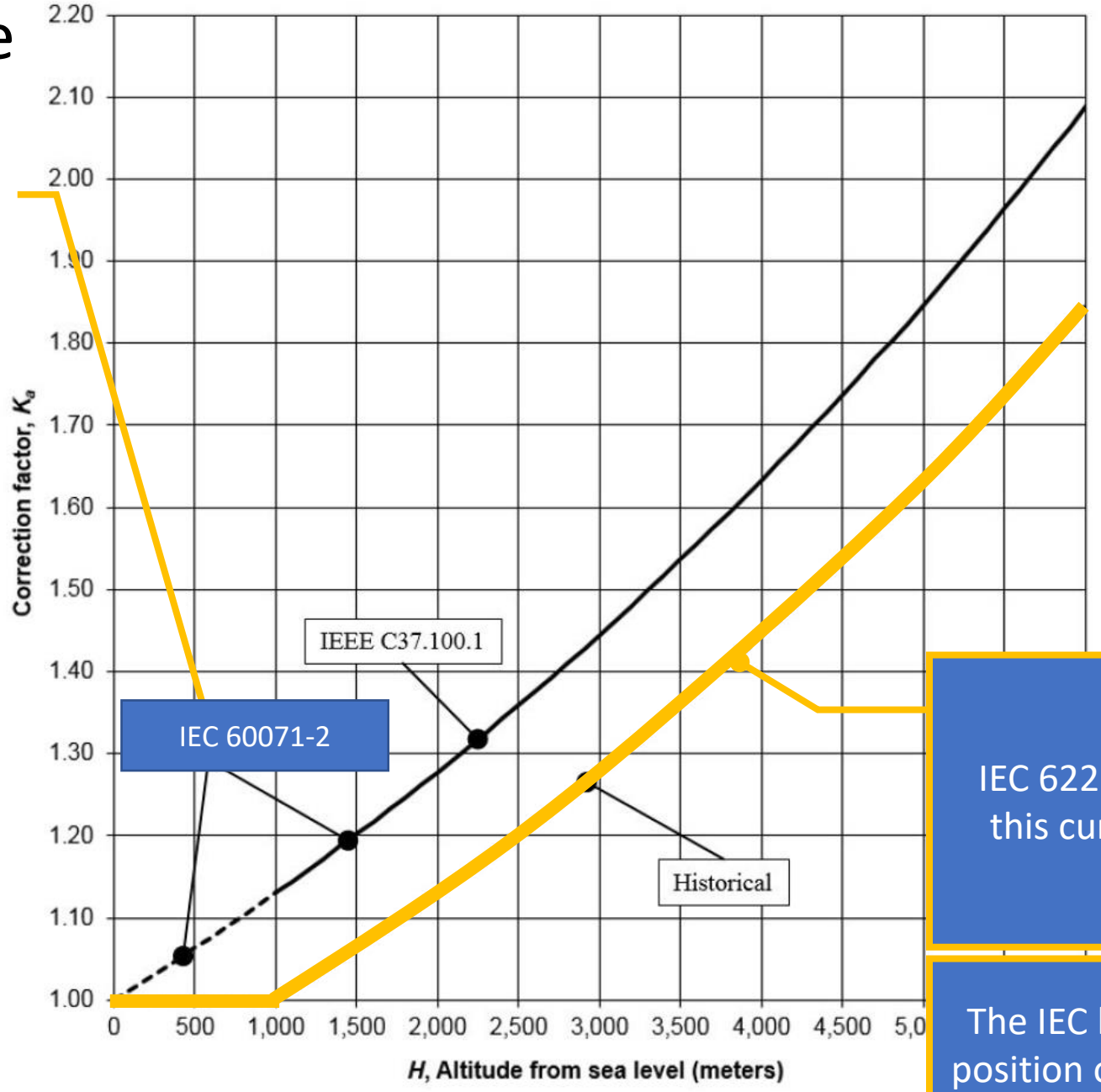


Figure B.1—Altitude correction: Three approaches for $m = 1$

IEC 62271-1:2017 carries over with this curve – no change from 2007

The IEC has been consolidating their position on the use of the lower curve

What should the next edition of IEEE C37.100.1 use?

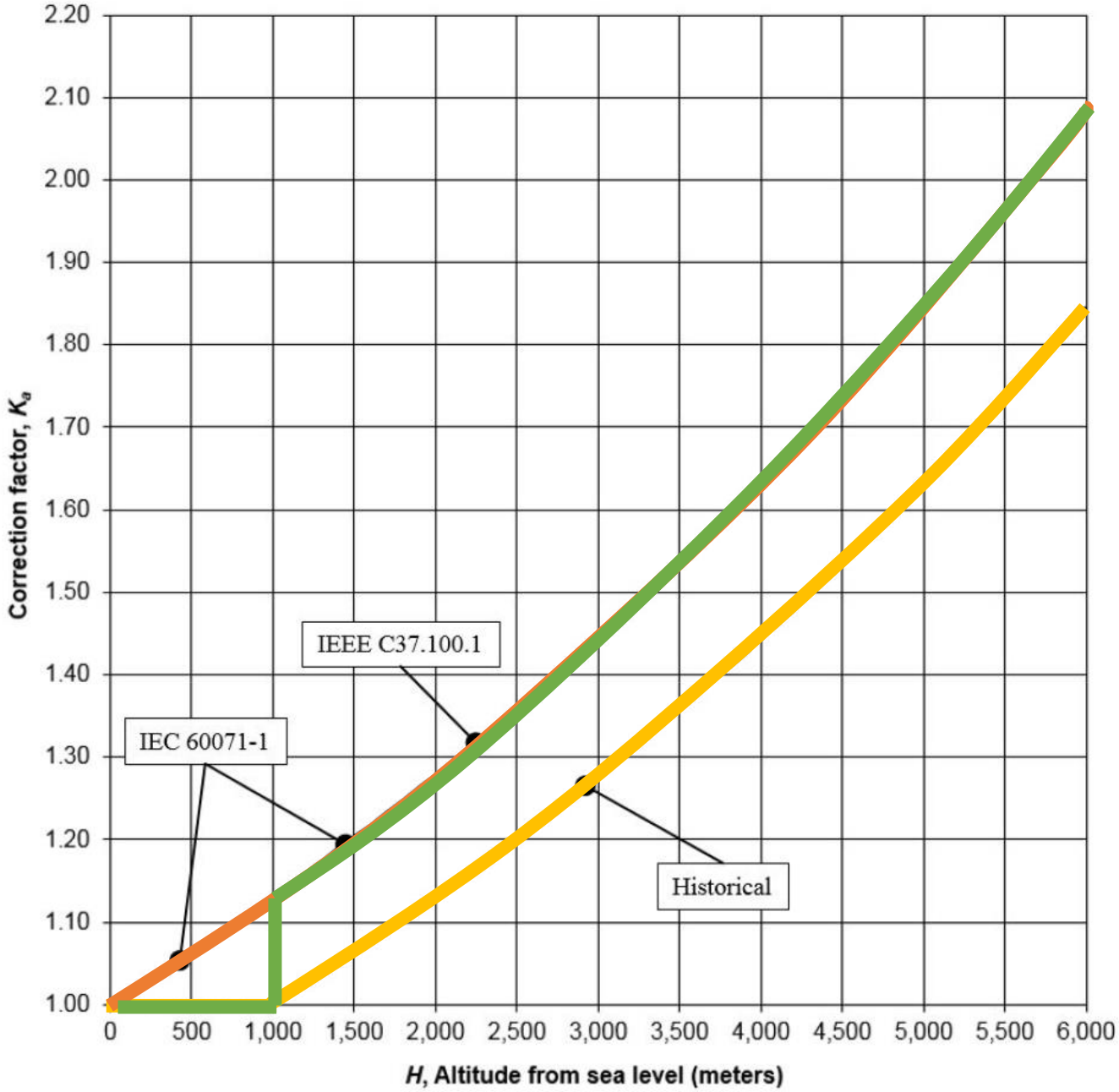


Figure B.1—Altitude correction: Three approaches for $m = 1$

Recommendation by the Task Force

Approach to standard:

- Adopt the “Lower curve” and associated equation
- Add verbiage explaining some historical background and the reasons why this curve is suitable for switchgear