PSCC Subcommittee WebEx Virtual Meeting Minutes - DRAFT

Designation:	Name:
PSCCC-F0	IEEE Fiber Optics Subcommittee

Meeting Location:	Meeting Times	Meeting Date:	Minutes Revised:	Minutes Approved:
Hybrid, Incab America Offices 900 Nolen Drive, Grapevine, TX	10 AM -- 5 PM – Day1 10 AM – 3 PM – Day2	2023/09/20-21	2023/10/20	

Presiding Officer:	Recorded by:
Chair: Delavar Khomarlou, Vice Chair: Jack Roughan Secretary: John Jones	J. Jones, J. Roughan, D. Khomarlou,

Attendance: Total attendees = xx members +Guests (M: Member, CM: Corresponding Member, G: Guest, I: IEEE)

	Affiliation	Attending via Phone (P) / Web (W) or Local (L)/ Absent (A)	M/CM/ G/I
Marie Henshaw	AFL	W	M
Peyton Campbell	AFL	W	M
Robert (Bob) Kluge	ATC – Retired	W	M
Corrine Dimnik	TBD	A	M
John Jones	PLP	L	M
Josep Martin Regalado	Prysmian	L	M
Felix Chen	ZTT China	A	M
Jack Roughan	ZTT China	L (Second day)	M
Gabriel Okafor	HPS	L	M
Tewfik Schehade	Independent Consultant	L	M
Delavar Khomarlou	Hydro One Networks	L	M
Brett Boles	Southern Company	L	M
Mike Riddle	Incab	L (host)	M
Monty Tuominen	MWT Consulting LLC –BP (Retired)	W	M
Tom Thompson	IEEE (liaison)	A	I
Emma Fulina	Shanghai Electric Cable Research Institute (SECRI)	A	M
Austin Farmer	AFL	W	M
Jaclyn Whitehead	AFL	A	M
Mark Naylor	AFL	W	M
Mike Warntjes	ATC (?)	A	M
Jacob Palmer	PLP	L	M
Paul Baird	Prysmian	W	M
Linda Cai	ZTT China	W	M
Lemon Lu	ZTT China	W	M
Greg Bennett	Southern Company	A	M
Christopher E. Royer	AEP	A	M
Yi Guo	Shanghai Electric Cable Research Institute (SECRI)	A	M
Jared Smith	AEP	A	M
Ernest Gallo	Ericson	W	M

Guests (New and Old)			
Dimitry Gilbert	Incab	L	G
Neil Saia		A	
Nathanael Winslow		A	
Jeff Pack		A	
Christian Riddle	Incab	A	G
Andrew Cresswell	Hubbell	A	G
ShenYiChun	ZTT	A	G
Jay Herman	EPRI	W (second day)	G
Jeff Wang	ZTT	A	G
Donna Pericolosi	ATC	A	G
Dan Baggett	AFL	A	G
Berjin Britto	??	W	G

Note:
G→M : Guest is eligible to become member if requested.

Item no.	Notes	Action by
CALL TO ORDER	September 20,2023, 10:00 AM (Central Time)	D. Khomarlou
INTRODUCTIONS, QUORUM	Quorum With 20/29 members and 2 guests in Hybrid meeting, no IEEE representative in this meeting. More than 50 % of members. 12 members attended face-to-face meeting. Special thanks to Mike Riddle and Incab America LLC for hosting this PSCCC-F0 meeting and great hospitality.	
CHAIR'S REMARKS	Chair presentation is attached. Marie Henshaw – AFL, accepted to be F0 representative to PSCCC awards working group. Requires meeting with the committee. (3-6 hours per year total – 3/year). Benefits: Exposure, learn how IEEE works, and champion the awards for our group. Per A0 instructions, we must re-organize back to Working Groups (WG). F1: IEEE 1222 All Dielectric Self-Supporting Cable (responsible for 1222 ADSS cable) and IEEE 1591.2: ADSS Attachment Hardware, Chair: Paul Baird, Prysmian, Vice-Chair: John Jones, PLP) F2: IEEE 1138 Optical Ground Wire (responsible for 1138 OPGW cable) and IEEE 1591.1: OPGW Attachment Hardware, Chair: Mike Riddle, Incab, Vice-Chair: Brett Boles, Southern Company F3: IEEE 1594 Helically Applied (Wrapped) Fiber Optic Cable (1594 cable and 1591.3 attachment hardware): Chair: Mark Naylor, AFL, Vice-Chair: TBD (Mark to advise) F4: IEEE 1595 OPPC (1595 cable and 1591.4 attachment hardware), Chair: Jack Roughan, ZTT or Josep Martin (Prysmian) Due to our new work in Fiber End of Life, we need expertise in Fiber (at strand level) and could benefit from having an expert from Corning or OFS or any other of our current manufacturers who draw their own fiber. If anyone knows or wants to reach out to these experts within the companies, please do. PSCCC main group requiring our attendance for face-to-face meetings. Del has asked to delay this to September 2024. One face to face (hybrid meeting) will be proposed.	D. Khomarlou
AGENDA APPROVAL	Agenda for the September 20-21 hybrid meeting was sent to all members prior to the call. The agenda was approved in this meeting. Agenda Approved – Ernest Gallo, Second JLJones	D. Khomarlou
APPROVAL OF PREVIOUS MINUTES	Draft Minutes of June 21, 2023 virtual meeting has been placed in iMeetCentral and sent to members. Minutes were approved in this meeting. Motion to Approve:... Second the motion. Meeting minutes approved JLJones, Second Austin Farmer These minutes will be posted in the IEEE PSCCC website as **Final** for public access.	D. Khomarlou
IEEE 1138 News	No New Discussion Please see section on lightning test	D. Khomarlou
IEEE 1591.3 and 1594 Wrap Cable	Mark Naylor, AFL representative for 1591.3 and 1594 helically-applied cable was at the meeting and contributed greatly. Mark's role within AFL is changing. He is currently chosen as the chair of 1594/1591.3 WG and will continue. He may assign someone else from AFL to be his vice-chair. Notes from Previous Meetings: Radio Interference & noise issue has been documented in previous minutes. They were removed from this document. Ther is a need to make adjustments to 1594 and 1591.3 in the next revision.	M. Naylor

Item no.	Notes	Action by
IEEE 1595 Standard – 1595D6 OPPC –>Publication	No new information IEEE 1595 was published on April 11, 2023. Congratulations to the subcommittee members and Jack Roughan who led the effort.	Jack Roughan
1591.1 OPGW hardware	1591.1 – J. Jones. Recirculation was successful and following September REVCOM meeting, the standard has been sent for final edits and publication. Congratulations to subcommittee and John Jones who led the effort.	J. Jones/ B. Kluge
OPPC Hardware 1591.4	In order to address the comments on 1591.4 – we are requesting a 2 year Par extension – Approved 1591.4 OPPC Hardware Draft D4 balloting produced a number of comments, some of which are marked as "Mus be Satisfied". Jack Roughan went through the comments on September 21. IEEE Editor comments After discussion, the committee include specific reference to all subclauses from 1591.1. (rather than the existing "clause 5.5.2.1 to 5.5.2.3.5") It was noted that the PAR did not mention "Purpose" so the Purpose clause has been deleted. All other comments from IEEE editor were accepted without discussion. Other comments Noted that Reference [B2] in the bibliography is incorrect. This reference is used in several of our standards and needs to be updated in all. A number of other comments were discussed A copy of the updated draft together with the list of comments was circulated to the members after the meeting	L. Cai/ J. Roughan

<table>
<tr><th>Item no.</th><th>Notes</th><th>Action by</th></tr>
<tr><td>IEEE 524 liaison</td><td>Jack Roughan to discuss info from 524 and T&D committee.

Stringing tension for fibre cables was discussed
Noted that the 15% value is currently in IEEE524 and we agreed to use this value at our previous meeting .
Some discussion was had for whether this could be increased to 20% or even higher. The value of 20% is already mentioned in the paragraph of 524 noting that stringing should be limited to 20%. All manufacturers present noted that they were happy with this.

It was noted that our current table shows two rows for OPGW and OPPC, with one row for ≤ 0.9” and ≥ 0.9”. As no OPGW designs are greater than 0.9” it was agreed that the second row should just show OPPC ≥ 0.9”

The revised table is now:

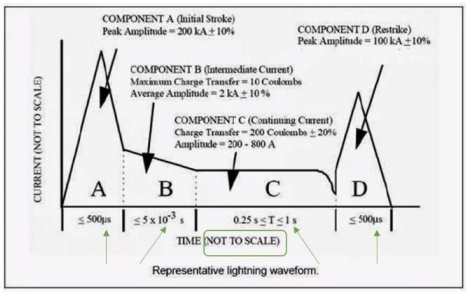
<table>
<tr><th>Cable Type</th><th>Spatial Angle**</th><th>Spans</th><th>Pulling/Stringing Tension *</th><th>Minimum Sheave Size(BOG)***</th></tr>
<tr><td rowspan="3">ADSS</td><td>≤ 10°</td><td>≤ 91.4 M (300 ft)</td><td>≤ 2.7 kN (600 lb)</td><td>Greater of either 254 mm (10”) or Cable OD x 20</td></tr>
<tr><td>≤ 20°</td><td>≤ 91.4 M (300 ft)</td><td>≤ 2.7 kN (600 lb)</td><td>Cable OD x 30</td></tr>
<tr><td>≥ 20°</td><td>Any span</td><td>≤ 2.7 kN (600 lb)</td><td>Cable OD x40</td></tr>
<tr><td>OPGW & OPPC OD ≤ 0.9”</td><td>≤ 90°</td><td>Any span</td><td>≤ 20% of RTS****</td><td>Greater of either 609 mm (24”) or Cable OD x 40</td></tr>
<tr><td rowspan="3">OPPC OD >0.9”</td><td>≤ 20°</td><td rowspan="3">Any span</td><td rowspan="3">≤ 20% of RTS</td><td>Greater of either 609 mm (24”) or Cable OD x 40</td></tr>
<tr><td>> 20° - ≤ 60°</td><td>Cable OD x 50</td></tr>
<tr><td>> 60° - ≤ 90°</td><td>Cable OD x 60</td></tr>
</table>
</td><td>NA</td></tr>
<tr><td>IEEE 1591.x Task Force Group</td><td>No new Info to report.
Committee will meet when revisions to the 1591.x standards are next due for revision.

Background information from previous meetings.
Current membership is 13: Jack Roughan, Linda Cai, Lemon Lu, Josep Martin Regalado, Tewfik Schehade, John Jones, Mark Naylor, Del Khomarlou, Dan Baggett, Peyton Campbell, Gabriel Okafor.</td><td>J. Roughan</td></tr>
</table>

Item no.	Notes	Action by
IEEE 525 and PSCCC E0 Liaison **And** **EPRI Work**	IEEE 525- DKH - Cables within substation - Reference IEEE 1138 and 1222. - Grounding in substations. - Utility members are good candidates to become Liaison. E0 and F0 have provided comments to IEEE 525 four years ago. Chair attended substation committee. 525 didn't have any further comments on F0/E0 comments. PSCCC-E0 Wireline subcommittee (D. Khomarlou liaison). Ernest Gallo provided update: • E0 work on IEEE 367 (Methods of GPR calculation) is in process. • 487.2 Communications to substation. • E0 Group Senior members are retiring and there is currently no succession planned • Leadership is needed to take over. • If F0 decides to adopt 487.2, other standards such as 487 and 367 will need to be adopted as they are all inter-related, so all must be taken as a package. • Limited members and dealing with relatively obsolete technology. Jay Herman (Day 2)– EPRI – planning to write a strategic fiber guidebook. Member utilities, end of life is a big issue.	D. Khomarlou
IEC Liaison **ITU Liaison**	IEC standard chart (placed in the document) No New Information as the next IEC meeting is in November 2023. Josep Martin leads the short-circuit (IEC 60794-1-401) and lightning (IEC 60794-1-402) test methods and he is now in charge of the Aeolian vibration test method (IEC 60794-1-119) Josep noticed a discrepancy in IEEE 1222 with regards to Aeolian vibration.	Josep Martin
IEEE 1222	No New item for IEEE 1222 A Corrigendum must be issued to cover the issue of error in Aeolian Vibration Testing (AVL). For AVT, the number of cycles is only 1 million (but it was 100 million in 2011 revision). Pass criteria for AVT and Galloping is 0.2 dB/km. Looks a large value. Should be reviewed. Pass criteria for Sheave test in 1222 and 1138 is 1.0 dB/km. Looks a huge value – To be reviewed. Fiber Proof Test was discussed. As cable is tensioned to MRCL, fiber strain must be less than 20% of proof strain. This corresponds to .20 % for most fiber (100kpsi proof test = 1% strain).	

Item no.	Notes	Action by
dB vs dB / km Discussion	The dB vs dB/km criteria for some tests, especially those that deal with short length of the cable should be considered. Some entities monitor dB – test length of 20 to 50 meters and using an optical switch. Background on dB vs dB/km: For Tensile test procedure since IEC will consider dB not dB/km. Differentiation of "distributed test in dB/km" vs "local test in dB" . IEC will consider dB/fiber units for the pass criteria of Tensile test. Fibers can be monitored individually (not in a loop) using an optical switch. Pass criteria for dB vs dB/km. IEC – Indivisually monitors and measures each fiber for dB change, for example in the Tensile test. IEEE – Tensile, Sheave, and Temperature test. Concatenated fiber are shown in dB/km. Josep reviewed current IEEE standards and found the following Tensile test ADSS – dB vs OPGW – dB/km Mike Riddle provided examples of test reports from Kinectrics which report all values in dB/km. From other test reports, both Aeolian vibration and Sheave test criteria are quoted as 0.1 dB/test-fiber based on IEEE 1138-2009. Crush test and twist tests are also reported as dB/test-fiber. dB/km is used in the following tests where fiber is concatenated. • Tensile Test • Sheave Test • Temperature Test • Short Circuit Test IEEE 1222, however, shows pass criteria in dB in several instances. Section 6.5.2 Tensile Test criteria in 1222 is: 0.05 dB at 1550 nm 0.1 dB at 1310 nm The pass criteria are in dB, not dB/km. That's different for IEEE 1138 that specifies dB/km. –1138-2022 may be the correct one. Aeolian vibration (1222) criteria is 0.2 dB/km at 1550 nm Paul Baird mentioned that FOTP-38 is referenced for these tests in both 1138 and 1222 and we have to make sure our criteria match those. As there are differences in cables and test methods between ADSS and OPGW, there may be differences in the acceptance criteria for each cable/tests. Historically, OPGW standard was established before the ADSS cable standard. F0 members at the time agreed to make changes to the ADSS standard but resisted some of the changes to OPGW given the established track record of testing. The decision at the time was to write each standard as appropriate for the type of cable. One suggestion could be to devise a table which shows what measurement (dB or dB/fiber or dB/fiber km) criteria to be used for each test and each cable type and populate with numbers for each cable type/standard. Once agreed upon by all members, this generic table can be used as a uniform template for future standard developments.	
Sheave Size Recommendation/ IEEE 524	Discussed under IEEE 524 Liaison	J. Roughan

Item no.	Notes	Action by
Preforming Concern – OPGW, OPPC	This item was not discussed and is placed here only for reference. Preforming is a standard part of cabling. Critical in outside layer to help contain the wrap if damaged. Pass/Fail for routine test requirement. Could be added to next update for IEEE 1138. It may be covered by other standards that are referenced. IEEE 1138 standard may need to be updated in the next cycle with information on preforming wire. IEC 61089 – covers preforming wires. There are other standards that have similar wording. Add test to 1138 and 1595. IEEE 1595 OPPC: In the OPPC standard- regarding dead-ends, a statement that the dead-end rating is transferable to OPGW cables of lesser rated designs.	
Presentation(s)	Two Presentations provided : 1). Incab Presentation: 200 um Optical Fiber – Mike Riddle To meet the need to have more fiber in the cable, has many advantages, but some disadvantages as well. Paul Baird added to the discussion and a slide on Microduct Cable Evaluation – mostly for Metro area applications. General Discussion. - OPGW fiber counts generally increasing - General trend to increase fiber density. - Higher density in cases when loss higher have applications in Metro environments. 2). Grid Modernization Effects on Fiber Development – Brett Boles, Southern Company Southern Company is finding that the new Grid Modernization efforts bring the need to have more fiber deployment. Southern Company doesn't install OPGW on 500 kV lines as outages for installation and subsequent maintenance are hard to obtain. This generated some discussion. Please See Bob Kluge's information – Placed in attachment area.	Brett Boles Mike Riddle

Item no.	Notes	Action by
Lightning (OPGW)	Should we revisit the Lightning test in the OPGW standard? Current standard lists classes and we have changed acceptance criteria between 1138-2009 and 1138-2022. Perhaps a guide is needed to help the users determine what class applies (and in what geographical area) and taking into consideration ground resistivity/tower footing resistance. The waveform from MIL-STD-464 is used in testing for lightning and is derived from historic research. **OPGW Lightning Performance** **Theoretical Background – Damage from Continuing Current**  Representative lightning waveform. First, observe the amplitudes Then, pay special attention to the durations: • A = microseconds = 10^{-6} • B = milliseconds = 10^{-3} • C = seconds = 10^{0} • D = microseconds = 10^{-6} But this waveform may no longer represent the actual lightning intensity today. Ernest Gallo mentioned that an IEEE standard is looking at re-defining these curves. He mentioned historically equipment and cable that were tested to this standard performed well in the field during lightning conditions. The isokeraunic map (US) shows areas with higher frequency of lightning strikes but not the energy level of the strikes. US Geological Maps have grounding maps. The designer guideline may introduce a flow chart. (Bob Kluge) New item that has come up since our September meeting through UTC forum: Possibility that lightning strike on OPGW can cause the change in State of Polarization of light inside OPGW. This in turn causes errors on 100 Gb/s or higher Coherent optical communication which often use Polarization dependent modulation. Currently under investigation by utilities. Likely to get worse as 8 or 16 QAM or higher modulation methods are used in the future.	

Item no.	Notes	Action by
New /Other Business	**OPPC/OPGW/ADSS/Helical End of Life Determination Study and Scope** Discussion on writing a new technical guide which describes any new type test, factory or field testing for aerial cables (all fiber cables or perhaps only aerial cables) to determine End-of-Life(EOL) criteria for F0 cables. **Study group for Sensing applications (Brillouin, Raman,..) using aerial fiber optic cable**. Open Discussion on these two topics on Day 2 was interesting as we have (and can obtain) great expertise to develop new methods. The notes here are an attempt to document these discussions, but may not be comprehensive. The material associated with this work and discussion will be placed in iMeetCentral. What is a viable method to determine an aerial cable's ageing? • Attenuation Change in dB/km over time as an indicator, taking into account fiber ageing allowances. • Testing at specific wavelengths (OH-: 1383 nm, H2: 1240 nm) to establish health of fibes • Can the concept of strain analysis / budget be developed to establish the remaining life of fiber? Based on its exposure to stresses/strains due to environmental conditions (icing, vibration). Strain Analysis (Look at where you might have had strain and how long – treat as accumulative). Is this a concept worth further exploration? **Please see an excellent reference contribution from Josep Martin on this topic placed in the attachments section of this document.** • Can Polarization Mode Dispersion (PMD) be used as an indicator of fiber health. • Can external tests (e.g. LineView developed by Kinectrics) be used to assess level of corrosion on ACSR wires without causing interruption? • Pressure Testing of the Optical tube? A Dry tube with water blocking tape may be better suited. • Any new ideas our member experts can think of…. Time will be set aside in the next meeting to continue this discussion. Other Work: Did not consider these work in detail in this meeting. These are from previous meeting: Tewfik – asked about standards for other fiber cables. Mike Riddle suggested blown in fiber and FTTH application. (Mentioned 2 companies turn-key. – cable TV is one).	
ITEMS REPORTED OUT OF EXECUTIVE SESSION	NA	
OTHER ITEMS		

Item no.	Notes	Action by
CLOSING	Please let chair / vice-chair know if you don't have access to iMeetCentral.	
NEXT MEETINGS	The next Meeting will be a virtual (Microsoft Teams) meeting on December 12, 2023 Time: 9 AM – 12:30 PM Eastern Daylight Time MS Teams Details and agenda will be sent out closer to the meeting time.	
Meeting Adjournment	Meeting adjourned at 3:00 PM (Central time) on September 21, 2023.	
MATERIAL TO BE PLACED IN iMeetCentral or Attached	1. IEEE Copyright statement (included in this document) 2. IEEE Patent and duty to inform clause (included in this document) 3. Chair Presentation - June 2023 (to be attached to email) 4. Corning paper on Mechanical Reliability of Fiber	

IEC LIAISON – JOSEP MARTIN

IEC SC86A WG3 (Optical Cables) Liaison report May 2023

IEC SC86A WG3 meeting hold on May 10th-12th 2023 in Kyoto (Japan). 51 out of 102 members attended

RELEVANT TOPICS TO IEEE PES PSCCC-FO GROUP

- Status of roll-out plan for IEC 60794-1-2x (optical cable test procedures)

Standard	Required	Published	FDIS	CD/CDV	Draft	Deleted	To Start
-1-21 (mechanical)	36	0	0	1 → 4 (+4)	7 → 2	4 → 5(+1)	25
-1-22 (environmental)	20	4	0	1 → 9 (+7)	10 → 3	4	0
-1-23 (cable elements)	12	1 → 5 (+4)	0 → 2	9 → 3	1	1	0
-1-24 (electrical)	4	4	0	0	0	0	0
Total	72	9 → 13	2	11 → 16	18 → 6	9 → 0	25

Committee draft for comments (CD)
Committee draft for vote (CDV)
Final draft international standard (FDIS)

- New Draft assignments:

14 New Drafts assigned →

60794-1-102 – Abrasion, E2 – Tai Liu
60794-1-103 – Crush Resistance, E3 – Tai Liu (CN)
60794-1-105 – Stripping force, E5A – Dongxiang Wang
60794-1-106 – Repeated Bend, E6 – Yi Guo
60794-1-107 – Torsion, E7 – Zhou Juan
60794-1-108 – Flexing, E8 – Hiroki Ishikawa
60794-1-117 – Bending Stiffness, E17A – Jianbin Duan
60794-1-118 – Bending under tension, E18A – Yi Guo
60794-1-119 – Aeolian vibration, E19 – Josep Martin (ES)
60794-1-125 – Ripcord functional test, E25 – David Kozischek
60794-1-129 – Straight midspan access, E29 – Zhou Juan
60794-1-130 – Co-efficient of friction between cables, E30 – Taiji Sakamoto
60794-1-132 – Creep test (for ADSS), E32 – Jose O Valenzuela (MX)
60794-1-135 – Sheave test (OPGW & OPAC), E18B – Yi Guo (CN)

IEC SC86A WG3 (Optical Cables) Liaison report May 2023

- Stability dates of published relevant standards (no changes)

Publication Number	Standard	Stability Date
IEC 60794-1-219:2021 ED1	Material compatibility	2024
IEC 60794-1-220:2022 ED1	Salt spray corrosion	2025
IEC 60794-1-401:2021 ED1	Short-circuit	2024
IEC 60794-1-402:2021 ED1	Lightning	2024
IEC 60794-1-403:2021 ED1	Electrical continuity	2024
IEC 60794-1-404:2022 ED1	Current temperature test	2025

Publication Number	Standard	Stability Date
IEC 60794-4:2018 ED2	Aereal cables for OHTL	2024
IEC 60794-4-10:2014 ED2	OPGW	2024
IEC 60794-4-20:2018 ED2	ADSS	2024
IEC 60794-4-30:2021 ED1	OPPC	2024

- Other interesting topics:
  - Neverending discussion about **dB** vs **dB/km** focused on Tensile test. I tried to argue based on "distributed test in dB/km" vs "local test in dB". IEC will definitively consider dB sincemost of the times, fibers are monitored individually.
  - Fast check IEEE 1122 vs IEEE 1138 shows:
    - For tensile test (6.5.1.2) in IEEE1122, the pass criteria is in **dB**. That's different for IEEE 1138, since it is in dB/km.
    - For AVT, the number of cycles is only 1 million (but it was 100 millions in 2011 revision). Looks small # of cycles
    - For Sheave, pass criteria is 1.0 dB/km. Looks a huge value
    - For Galloping, pass criteria is 0.2 dB/km. Looks a large value. Being a distributed test, units are dB/km but different than tensile test, why

Next meetings: Autumn 2023 - Nov 17-20th 2023 in Milano (IT); Spring 24 → Paris (FR); Autumn 24 → Edinburgh (UK).

IEC CABLE STANDARDS - From Josep

Indoor Cables

60794-2 Ed4 2017; Optical fibre cables - Part 2: Indoor cables - Sectional specification; stability date 2024
60794-2-10 Ed2 2011; Optical fibre cables - Part 2-10: Indoor optical fibre cables - Family specification for simplex and duplex cable; stability date 2023
60794-2-11 Ed3 2019; Optical fibre cables - Part 2-11: Indoor cables - Detailed specification for simplex and duplex cables for use in premises cabling; stability date 2025
60794-2-12 Draft - In house cabling (not approved)
60794-2-20 Ed3 2013; Optical fibre cables - Part 2-20: Indoor cables - Family specification for multi-fibre optical cables; stability date 2024 (family spec)
60794-2-21 Ed3 2019; Optical fibre cables - Part 2-21: Indoor cables - Detailed specification for multi-fibre optical distribution cables for use in premises cabling; stability date 2025
60794-2-22 Ed1 2016; Optical fibre cables - Part 2-22: Indoor cables - Detail specification for multi-simplex breakout optical cables for use in terminated breakout cable assemblies; stability date 2024
60794-2-23 CDV Optical fibre cables - Part 2-23: Indoor cables – Detail specification for multi-fibre cables for use in MPO connector terminated cable assemblies (Next step FDIS)
60794-2-24 CDV Optical fibre cables - Part 2-24: Indoor cables – Detailed specification for multiple multi-fibre unit cables for use in MPO connector terminated breakout cable assemblies (Next step FDIS)

60794-2-30 Ed3 2019; Optical fibre cables - Part 2-30: Indoor cables - Family specification for optical fibre ribbon cables for use in terminated cable assemblies; stability date 2024
60794-2-31 Ed3 2019; Optical fibre cables - Part 2-31: Indoor cables - Detailed specification for optical fibre ribbon cables for use in premises cabling; stability date 2025
60794-2-40 Ed2 2008; Optical fibre cables - Part 2-40: Indoor optical fibre cables - Family specification for A4 fibre cables; stability date 2024
60794-2-41 Ed1 2008; Optical fibre cables - Part 2-41: Indoor cables - Product specification for simplex and duplex buffered A4 fibres; stability date 2024
60794-2-42 Ed1 2008; Optical fibre cables - Part 2-42: Indoor cables - Product specification for simplex and duplex cables with A4 fibres; stability date 2024
60794-2-50 Ed2 2020; Optical fibre cables - Part 2-50: Indoor cables - Family specification for simplex and duplex cables for use in terminated cable assemblies; stability date 2024
60794-2-51 Document withdrawn.

Outdoor Cables
60794-3 Ed4 2014; Optical fibre cables - Part 3: Outdoor cables - Sectional specification; stability date 2025
60794-3-10 Ed3 2015; Optical fibre cables - Part 3-10: Outdoor cables - Family specification for duct, directly buried and lashed aerial optical telecommunication cables; stability date 2024
60794-3-11 Ed2 2010; Optical fibre cables - Part 3-11: Outdoor cables - Product specification for duct, directly buried, and lashed aerial single-mode optical fibre telecommunication cables; stability date 2024
60794-3-12 Ed2 2021; Optical fibre cables - Part 3-12: Outdoor cables - Detailed specification for duct and directly buried optical telecommunication cables for use in premises cabling; stability date 2024
60794-3-20 Ed3 2016; Optical fibre cables - Part 3-20: Outdoor cables - Family specification for self-supporting aerial telecommunication cables; stability date 2024
60794-3-21 Ed2 2015; Optical fibre cables - Part 3-21: Outdoor cables - Product specification for optical self-supporting aerial telecommunication cables for use in premises cabling; stability date 2024
60794-3-30 Ed2 2008; Optical fibre cables - Part 3-30: Outdoor cables - Family specification for optical telecommunication cables for lakes, river crossings and coastal application; stability date 2024
60794-3-40 Ed2 2022; Optical fibre cables - Part 3-40: Outdoor cables - Family specification for cables for storm and sanitary sewers; stability date 2027
60794-3-50 Document withdrawn
60794-3-60 Document withdrawn
60794-3-70 Ed1 2021; Optical fibre cables - Part 3-70: Outdoor cables - Family specification for outdoor optical fibre cables for rapid/multiple deployment; stability date 2025

Aerial cables along electrical power lines
60794-4 Ed2 2018; Optical fibre cables - Part 4: Sectional specification - Aerial optical cables along electrical power line; stability date 2024
60794-4-10 Ed2 2014; Optical fibre cables - Part 4-10: Family specification - Optical ground wires (OPGW) along electrical power lines; stability date 2024
60794-4-20 Ed 2 2018; Optical fibre cables - Part 4-20: Sectional specification - Aerial optical cables along electrical power lines - Family specification for ADSS (all dielectric self-supported) optical cables; stability date 2024
60794-4-30 Ed1 2021; Optical fibre cables - Part 4-30: Aerial optical cables along electrical power lines - Family specification for optical phase conductor (OPPC) optical cables; stability date 2024 (OPPC)

Microduct cabling for installation by blowing
60794-5 Ed2 2014; Optical fibre cables - Part 5: Sectional specification - Microduct cabling for installation by blowing; stability date 2024
60794-5-10 Ed1 2014; Optical fibre cables - Part 5-10: Family specification - Outdoor microduct optical fibre cables, microducts and protected microducts for installation by blowing; stability date 2024
60794-5-20 Ed1 2014; Optical fibre cables - Part 5-20: Family specification - Outdoor microduct fibre units, microducts and protected microducts for installation by blowing; stability date 2024

Indoor-Outdoor Cables
60794-6 Ed1 2020; Optical fibre cables - Part 6: Indoor-outdoor cables - Sectional specification for indoor-outdoor cables; stability date 2025
60794-6-10 Ed1 2020; Optical fibre cables - Part 6-10: Indoor-outdoor cables - Family specification for universal indoor-outdoor cables; stability date 2025
60794-6-20 Ed1 2020; Optical fibre cables - Part 6-20: Indoor-outdoor cables - Family specification for flame retardant outdoor cables; stability date 2025
60794-6-30 Ed1 2020; Optical fibre cables - Part 6-30: Indoor-outdoor cables - Family specification for weatherised indoor cables; stability date 2025

Fire resistant optical fibre data communication cables
60794-7 (under development, draft)

Automotive
60794-8 (under development, draft)

Technical Report Document set
TR 62222 Ed3 2021; Fire performance of communication cables installed in buildings; stability date 2025
TR 62362 Ed2 2020; Selection of optical fibre cable specifications relative to mechanical, ingress, climatic or electromagnetic characteristics – Guidance; stability date 2024
TR 62470 Ed1 2011; Guidance on techniques for the measurement of the coefficient of friction (COF) between cables and ducts; stability date 2024
TR 62690, Ed1 2014; Hydrogen effects in optical fibre cables – Guidelines; stability date 2032
TR 62691, Ed2 2016; Guidelines to the installation of optical fibre cables; stability date 2024
TR 62901, Ed1 2016; Guide for the selection of drop cables; stability date 2024
TR 62959, Ed1 2021; Shrinkage effects on cable and cable element end termination – Guidance; stability date 2025
TR 63194, Ed1 2019; Guidance on colour coding of optical fibre cables; stability date 2024
TR 63431, Microduct Technology (under development, CD)
TR 63442, Rodent (under development, CD)
TR 63484, Fungus (under development, draft)

Chair Presentation:

To be Attached to Minutes.

Bob Kluge's Comments on installation of OPGW on 500 kV lines:

Regarding our Optical Fiber standard, we've substantially improved our requirement for lightning resistance testing for OPGW. I listened with interest to Southern Company's reasons for not installing OPGW on 500-kV lines. They've obviously also experienced outage on lines due to OPGW failures and he specifically mentioned lighting as a frequent cause.

That was the original reason why I joined this committee. In my opinion, the standard for OPGW's resistance to lightning was totally inadequate. Thank you for improving the requirement for lightening testing.

At my company, rather than to discontinue using OPGW for lines requiring high reliability, I revised our standard OPGW to have more reliable OPGW for all lines and especially conservative designs for 345k'v lines. We also have OPGW designs for replacing shield wire on les significant lines.

I think the lightning requirement could be further enhanced in our standard. But I'm very pleased with the enhancements we've completed.

Fiber EOL Discussion:

Contribution to Strain Analysis by Josep Martin (Corning Mechanical Reliability Paper – Attached - can be an asset in understanding this concept)

"The optical fiber mechanical reliability strongly depends on the elongation history of the fiber in the cable since, under stress conditions, the small flaws remaining in the fiber glass after the screening test may propagate and enlarge leading to a fiber failure in the field. Optical fibers are very sensitive to static fatigue which is related to the crack growth (stress corrosion) when fiber is under load. The effect is cumulative, so fiber failure probability depends on the static fatigue during fiber processing, cable manufacturing process as well as cable in-service during its life time.

The most relevant stress event for a fiber during manufacturing is proof testing. All optical fibers are submitted at the end of their production process to a screening test (i.e. 1% elongation during 1 second) to stress the fiber glass and force fiber failure in case of internal flaws or cracks. The fiber length sections passing the screening test does not guarantee that the fiber glass is defect free since small flaws or cracks may still be present.

During the optical cable production, the fiber is submitted to processes like fiber coloring and loose tube buffering, in which will be exposed to light fatigue stress (<0.1% elongation) during few seconds. Along cable installation, depending on the cable design, fiber can also be exposed to additional fatigue stresses (<0.2% elongation) during minutes or even hours. Along cable lifetime (>25 years), the optical cable can be exposed to extreme environmental conditions like strong winds or heavy ice loads in which the optical fibers can be exposed to large fatigue stress (i.e 0.3% elongation for weeks or even months).

The most famous and simplest model to estimate fiber reliability is Mitsunaga reliability model (*J. Appl. Phys. 57(7) pp. 4847-4853*) which allows a failure probability calculation using the following formula:

$$F = 1 - \exp\left[N_p L \times \left\{1 - \left[1 + \left(\frac{\varepsilon}{\varepsilon_p}\right)^n \frac{t}{t_p}\right]^{\frac{m}{n-2}}\right\}\right]$$

where Np is the Failure probability during proof test (typically 0.01-0.05 km^-1), ε is the applied fiber strain, L is the length where the fiber is under strain (i.e. 10.0 km), ε_p is the applied strain during the proof (screening) test (i.e. 1.0%), t_p is the duration of the proof test (i.e. 1 sec), t is the time period of strain application during installation or cable lifetime, n is the static fatigue parameter (typically 20); and m the static Weibull modulus (typically 2-3).

Putting some numbers, it turns out that the most limiting factor for the fiber lifetime is the extreme environmental conditions that may bring the optical fibers to static fatigue conditions during long periods of time

	Lifetime	Installation	Production
Np	0.05	0.05	0.05
L	10	100	1000
e	0.3	0.3	0.1
e_p	1	1	1
t	1.00E+08	1.72E+05	1.00E+02
t_p	1	1	0.1
m	2	3	2
n	20	20	20
F [km^-1]	**1.93E-04**	**5.00E-06**	**0.00E+00**

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MAINTENANCE SCHEDULE FOR STANDARDS
UNDER PSCCC-F0

PRIORITY	DUE DATE	STANDARD NUMBER	STANDARD TITLE	LAST PUBLISHED DATE	ACTION (DEV / REVISION / COMMENTS ONLY	COMMENTS
	New PAR submitted. June 2024	IEEE-1138-2021	IEEE Standard for Testing and Performance for Optical Ground Wire (OPGW) for Use on Electric Utility Power Lines	2021	Published in 2021	Published in November 2021.
	No Active PAR Published in 2020	IEEE 1222-2020	IEEE Standard for Testing and Performance for All-Dielectric Self-Supporting (ADSS) Fiber Optic Cable for Use on Electric Utility Power Lines	2020	Published 2020	Published 2020
	No Active PAR. Published in 2020	IEEE 1594-2020	IEEE Standard for Helically Applied Fiber Optic Cable Systems (Wrap Cable) for Use on Overhead Utility Lines	2020	Replaced 2008 version	Published in 2020
	No Active PAR.	IEEE 1595-2023	Draft Standard for Testing and Performance for Optical Phase Conductor (OPPC) for Use on Electrical Utility Power Lines		Published April 12, 2023	
2	Active PAR Ex. Dec. 2022	IEEE 1591.1-2012	IEEE Standard for Testing and Performance of Hardware for Optical Ground Wire (OPGW)	2012	On track for Publication in 2023	Sent to IEEE final edit and Publication
	No Active PAR Published in 2020	IEEE 1591.3-2020	IEEE Standard for Qualifying Hardware for Helically Applied Fiber Optic Cable Systems (WRAP Cable)	2020	Replaced 2011 version	Published in 2020
1	PAR Approval May 2019 Exp. Dec. 2023	IEEE 1591.4-DRAFT	Standard for Testing and Performance of Hardware for Optical Fiber Composite Overhead Phase Conductor (OPPC)		D4	PAR extension to Dec 2025 pending REVCOM Dec meeting approval
	NA	IEEE 1591.2-2017	IEEE Standard for Testing and Performance of Hardware for All-Dielectric Self-Supporting (ADSS) Fiber Optic Cable	2018	No new Activity	May be revised as part of 1591.x task force work.
	Published Date: Apr. 2017	IEEE 524-2016	IEEE Guide for the Installation of Overhead Transmission Line Conductors		For comment only	Liaison Report
	NA	IEEE 524-2016	IEEE PSCCC-F0 recommendation for sheave sizing			Information provided for inclusion in IEEE 524.
	NA	IEEE 525-2016	IEEE Guide for the Design and Installation of Cable Systems in Substations		For comment only	Liaison Report. Table Q updated. Comment resolution pending

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All participants in this meeting have certain obligations under the IEEE-SA Patent Policy.

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Patent Related Links
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- IEEE-SA Standards Boards Bylaws (Clause 6) http://standards.ieee.org/develop/policies/bylaws/sect6-7.html
- IEEE-SA Standards Board Operations Manual (Clause 6.3) http://standards.ieee.org/develop/policies/opman/sect6.html
- Material about the patent policy is available at http://standards.ieee.org/about/sasb/patcom/materials.html

If you have questions, contact the IEEE-SA Standards Board Patent Committee Administrator at patcom@ieee.org or visit" http://standards.ieee.org/about/sasb/patcom/index.html
This patent information (slide set) is available at: https://development.standards.ieee.org/myproject/Public/mytools/mob/slideset.ppt

Call for Potentially Essential Patents

If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance (LOA): • Either speak up now, or

Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as possible, or
Cause an LOA to be submitted

Don't discuss the interpretation, validity, or essentiality of patents/patent claims.

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