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Electric Programs



Distribution Specifications

**2008 Electric Engineering Seminar
February 20, 2008
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DISTRIBUTION SPECIFICATIONS

- Bulletin 1728F-803 “Specifications and Drawings for 24.9/14.4 kV Line”.
- Was Issued originally in December 1998
- **Full Compliance** extended to **July 2001**
- Replaced Bulletin 50-5
- Includes Post Insulators but not Narrow Profile.
- Use of old assembly numbers on certain **NEW** drawings was approved March 7, 2001 (listing attached to approval letter and included in Items of Engineering Interest).
- AutoCad Drawings Available

DISTRIBUTION SPECIFICATIONS

- Bulletin 1728F-804 “Specifications and Drawings for 12.5/7.2 kV kV Line”.
- Was Issued in April 2005
- Effective date of the new Spec was October 2005
- Replaced Bulletin 50-3
- Includes Post Insulator drawings as well as Narrow Profile
- AutoCad drawings available

DISTRIBUTION SPECIFICATIONS

- Bulletin 1728F-806 “Specifications and Drawings for Underground Facilities”.
- Was Issued in June 2, 2000
- Effective date of the new Spec was June 26, 2000
- Replaced Bulletin 50-6
- AutoCad drawings available

RUS REQUIREMENTS AS TO CONSTRUCTION STANDARDS

*(Reference: Loan Contract Art. V- Sect. 5.14,
7 CFR 1710.7 and 1717.605)*

- **Loan Contract - Article V, Sect. 5.14**
“The borrower shall use design standards, **construction standards**,.... in conformance with RUS Regulations.”

**RUS REQUIREMENTS AS TO
CONSTRUCTION STANDARDS**

(Reference: Loan Contract Art. V- Sect. 5.14,
7 CFR 1710.7 and 1717.605)

- Under 1710.7, borrowers are not exempted from the requirement, contained in the Loan Contract and Mortgage, to comply with **RUS construction standards**

**RUS REQUIREMENTS AS TO
CONSTRUCTION STANDARDS**

(Reference: Loan Contract Art. V- Sect. 5.14,
7 CFR 1710.7 and 1717.605)

- Under 1717.605, all borrowers are required to comply with applicable **RUS construction standards**, regardless of the source of financing

Benefits of Standards



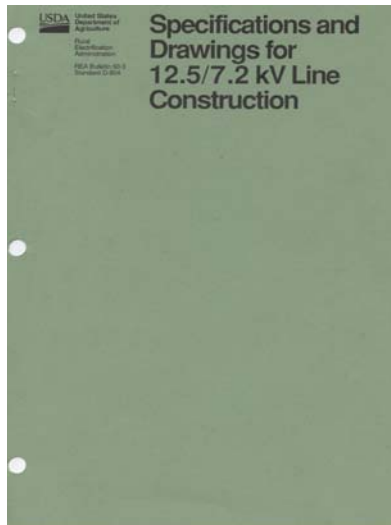
- No guesswork when issuing contracts or when bidders are bidding a contract
- Materials are standardized and pick lists made easier
- Materials used are known to be quality

Benefits of Standards



- During emergencies, contractors and other cooperative crews that come in to help know what to build.

New Features of Bulletin 1728F-804 (Similar to 25 kV Bulletin 1728F-803)



New narrow profile, other assemblies & guide drawings

New “Design Parameters”

New and “dual” numbers (re-used assembly numbers may be used)

New appendix exhibits
Disposition of old assemblies
Maximum line angle tables
Permitted crossarm load tensions

New Bulletin 1728F-804

Appendixes

19 “Category” Sections

Assembly Drawings

Applicable Tables

Section Specifications

Section Index

Overall Index & Specifications

New AutoCad Drawings

Post Type Insulators Added

Materials imply "Assembly"

New "Design Parameters"

Standard, Uniform Title Block and Drawing Titles

New Numbers !

ITEM QTY	MATERIAL
c 3	Bolt, machine, 5/8 x req'd length
d 3	Washer, square, 2 1/4"
do 1	Bracket, insulated
ea 1	insulator, post type (24.9/14.4 kv)
eb 1	Bracket, pole top
ek 3	Locknuts

DESIGN PARAMETERS: See TABLE II		SINGLE SUPPORT (POST INSULATORS)	
DEC 1998	RUS	1 - PHASE PRIMARY 24.9/14.4 kv	VA1_3P

New Guide Drawings

No Materials Imply Guide Drawing (List of Assemblies)

Note Design Parameters

New. 4-1/4 inch Insulators Shown

May use:
 three 6-inch
 two 9-inch
 one polymer deadend
 (Change material quantity as required)

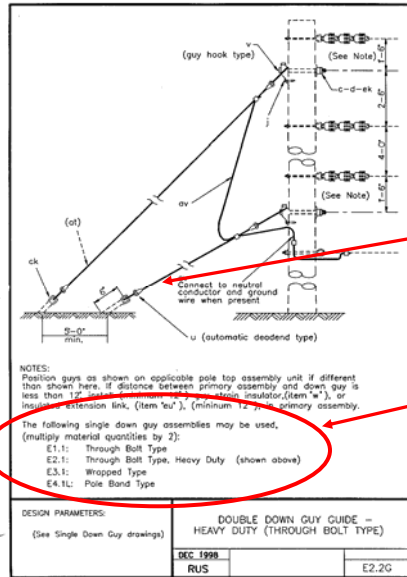
Number Suffix "G" implies Guide Drawing

NOTE: Tap assembly may be installed 6" from top of pole when perpendicular to line. Raise neutral and guy attachment 9" also.

ITEM QTY	MATERIAL
1	VA1.1 Primary Assembly
1	VA5.2 Primary Assembly
P	Connectors, as req'd
G	Bumpers, as req'd

DESIGN PARAMETERS: ALLOWABLE LONGITUDINAL LOAD = 5000 lbs./Conductor		SINGLE PHASE TAP GUIDE	
DEC 1998	RUS	1 - PHASE PRIMARY 24.9/14.4 kv	VA5.5G

New Guy Assembly Guide Drawings



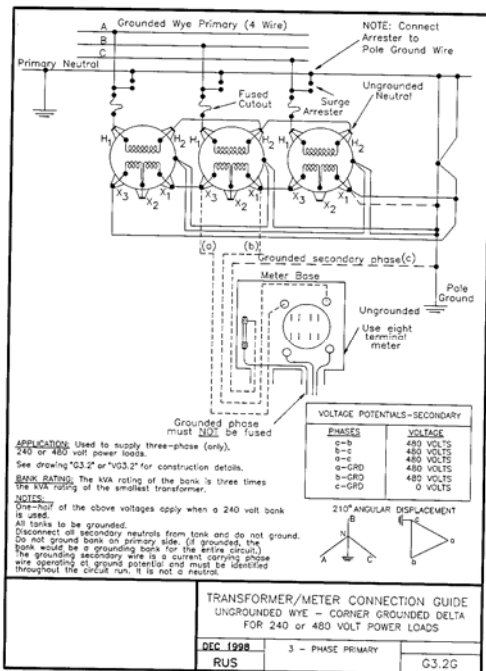
Fewer assemblies

New "Maximum Working Loads"

Guy Marker "at" (old "E3-10") now part of assembly

Multiple down guys are the sum of single down guy assemblies

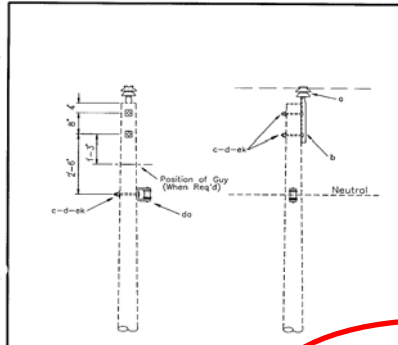
New Transformer/Meter Connection Guides



Better connection details without cluttering assembly drawings

Connection guide drawings show additive polarity. (Transformers larger than 200 kVA have subtractive polarity.)

Maximum Line Angles Referenced in "Design Parameters" on Assembly Drawings



MAXIMUM LINE ANGLES:
 5° - Small Conductors
 2° - Larger than #1/0

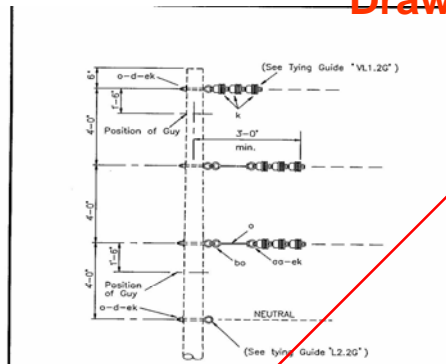
**Based on neutral
 conductor slipping
 off insulator**

DESIGN PARAMETERS:
 See TABLE I

ITEM QTY	MATERIAL
a	Insulator, pin type (24.9/14.4 kv)
b	Pin, pole top, 20"
c	Bolt, machine, 5/8" x req'd length
d	Washer, square, 2 1/4"
da	Bracket, insulated
ek	Locknuts

DESIGN PARAMETERS: See TABLE I		SINGLE SUPPORT	
DEC 1998	1 - PHASE PRIMARY		
RUS	24.9/14.4 kv	VA1.3	

Conductor Loading Limitations are given in the "Design Parameters" on Assembly Drawings



DESIGN PARAMETERS:
 ALLOWABLE LONGITUDINAL
 LOAD = 5,000 lbs./Conductor

- Equals 50% of the M&E rating of 4 - 1/4 inch suspension insulator.
- Assumes 3 inch square, curved washer resisting the tension.
 - For 2 - 1/4 inch square washers, decrease to 3,600 lbs
- Multiply all applied loads by the appropriate overload factors of NESC Table 253-1.

ITEM QTY	MATERIAL	NOTE
d	Washer, square, 3" curved	Distribution extension link, (item "du"), may be substituted for anchor shackle (item "bo"), eye bolt (item "c") and eye nut (item "aa").
k	Insulator, suspension, 4 1/4"	
a	Bolt, eye, 5/8" x req'd length	
da	Nut, eye, 5/8"	
bo	Shackle-anchor	
ek	Locknuts	

DESIGN PARAMETERS: ALLOWABLE LONGITUDINAL LOAD = 5,000 lbs./Conductor		SINGLE DEADEND - VERTICAL	
DEC 1998	3 - PHASE PRIMARY		
RUS	24.9/14.4 kv	VC5.1	



Bulletins 1728F-803,4,6

Reasons for Changes and Improvements

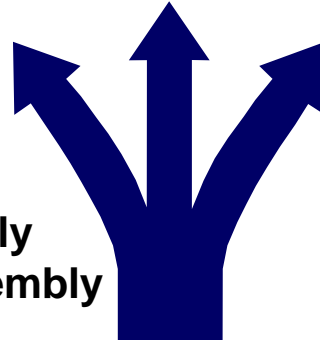
Why Bulletins Were Revised

- **Last updated in 1969 (803)**
- **Last updated in 1983 (804)**
- **Last updated in 1990 (806)**
- **NESC Changes**
- **Cut non-standard assemblies and materials**



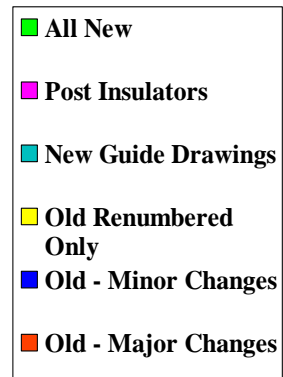
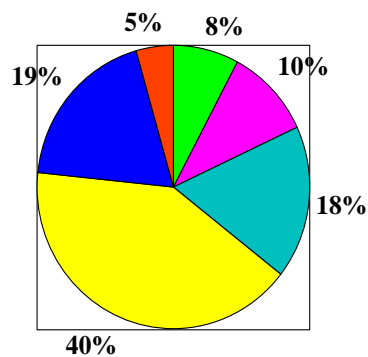
Larger Line Angles Possible Because:

- Use of post type insulators
- Washer under shoulder of crossarm pins
- Use of anti-split bolts
- Neutral Assembly properly matched to pole-top assembly



Sample of Changes

Bulletin 1728F-803



Specifications: Changes & Additions

- Allows stirrups
- Provides for use of extra large conductors
- Neutral may be lowered 2 feet for clearance requirements; additional 6 feet for bucket truck installation and maintenance.
- 3 inch square curved washer abutting pole.
- Washer under shoulder of crossarm pins.

Borrower Generated Assemblies & Numbers

- Only unmodified RUS assemblies are official
- Minor changes are OK
 - *(Add inventory numbers)*
 - *(Specify bolt lengths, etc.)*
 - Need not inform RUS
 - Modify number
- “Significant” changes or additions:
 - **Inform RUS for approval on “case-by-case” basis**





New Narrow Profile “Standards”

Complete sets available for both 12.47 and 24.9 kV construction

Each set has 92 assemblies plus guides for taps, cutouts and arresters

Each set includes post-type insulators

Each set has 3 fully developed designs with different bracket configurations



Design Features

Conductor spacing and staggered brackets allow longer spans (*even tangent to vertical assemblies*)

No need for taller poles

Can convert to 3-phase using existing pole & 1-phase assembly



New Designs Incorporate RUS Recommendations

Each assembly has a minimum of 12 inches of wood spacing between conductor supports

Each assembly has a minimum 300 kV BIL

Each assembly is relatively raptor friendly



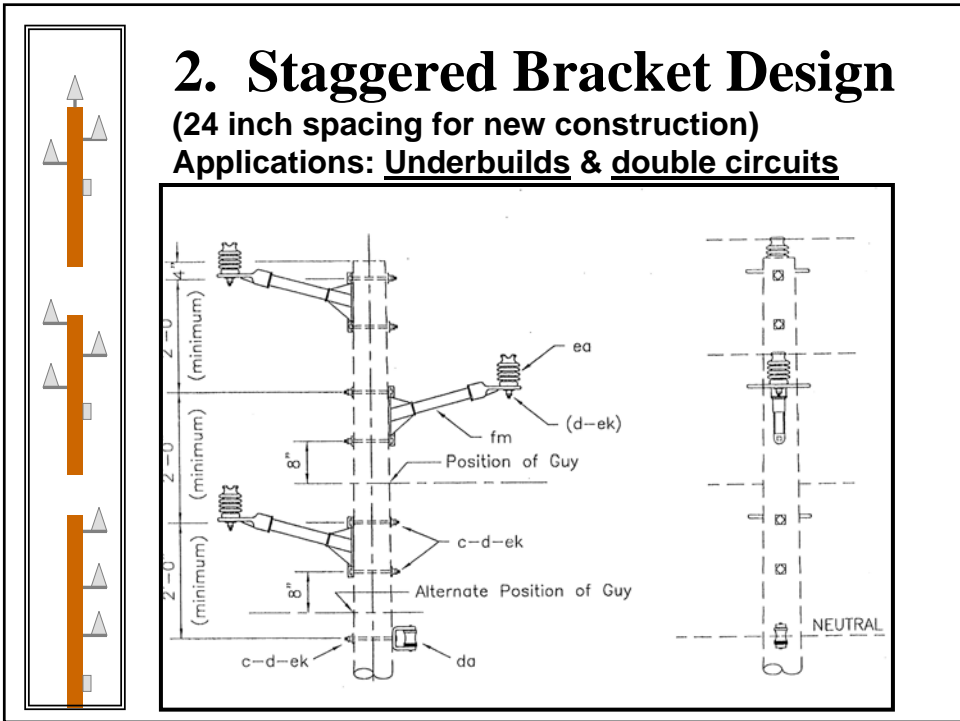
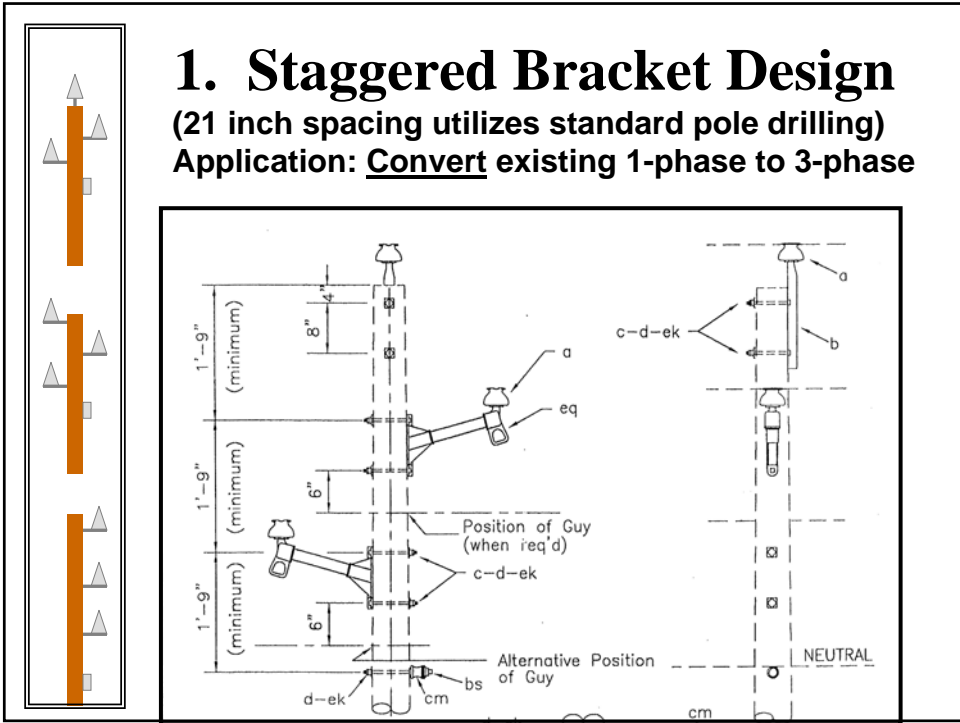
Additional Design Features

Each assembly meets NESC clearance requirements

Assemblies available for NESC Grade C and Grade B construction.

Each assembly can be constructed with material from “List of Materials”

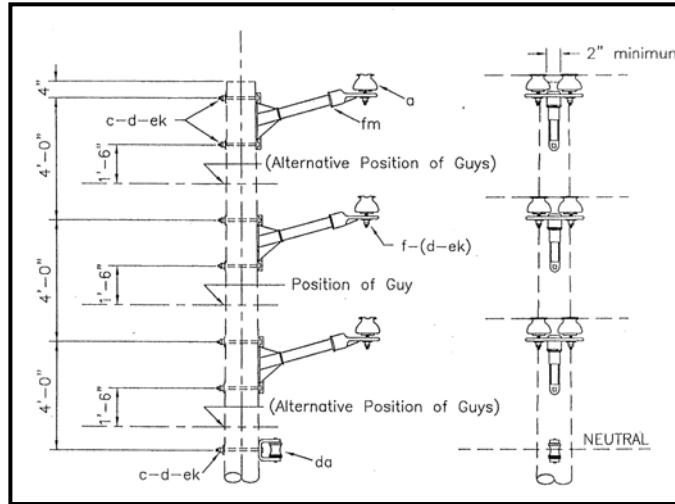
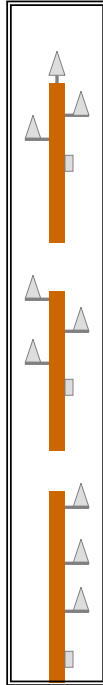
Assemblies available for all line angles



3. Vertical Design

(48 inch spacing for down guy clearances)

Applications: Narrow ROWs and tree clearances



“Triangular” design not recommended by RUS because:



Not raptor friendly

Limits span lengths

Less than 12 inches of wood separation

Less than 300 kV BIL

Needs same pole height

Narrow Profile Brackets, RUS “List of Materials”

**Any bracket from “List of Materials”,
(IP 202-1) may be used in new designs**

“eg” = NP brackets & special arm assemblies

“fm” = Extension bracket for mounting apparatus

May use fiberglass or steel

**RUS has ascertained vertical strength,
(for spans well over 400 feet)**

Engineers should check for long spans

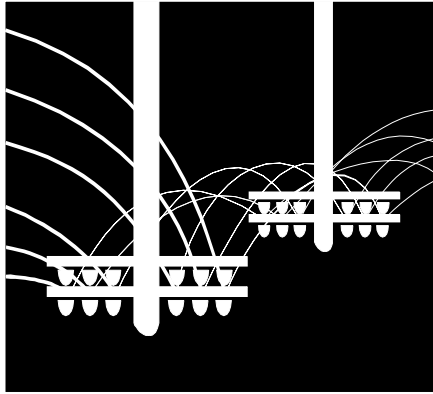
Errata Changes to the 25kV Spec

- Changes and additions to the 25kV Spec, Bulletin 1728F-803, have been published in various “Items of Engineering Interest”.
- Including but not limited to issues 1999 thru 2002.



FUTURE POSSIBILITIES

Underground



Overhead



RAPTOR PROOF

- Proposed new Raptor Proof Structure Provide by Dennis Rankin of the Environmental Staff Division



More Raptor Protection

- Another Innovative way to protect our endangered Raptors!



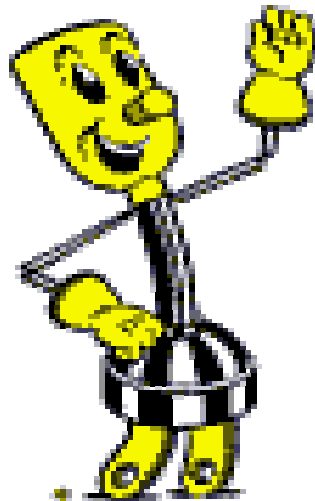
Submersible Substation Design

- Notice new substation inspection equipment required!



New Survey Tech's

- Able to see over trees and brush
- Can walk through the thickest undergrowth



**So Long for
Now!
BE SAFE!**