

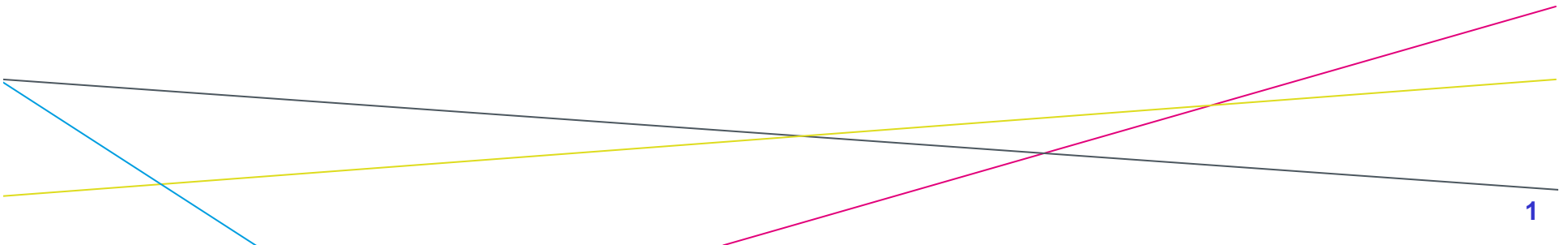


# Draka

Draka Comteq



## Draka Installation Considerations Including New Applications & Cable Designs



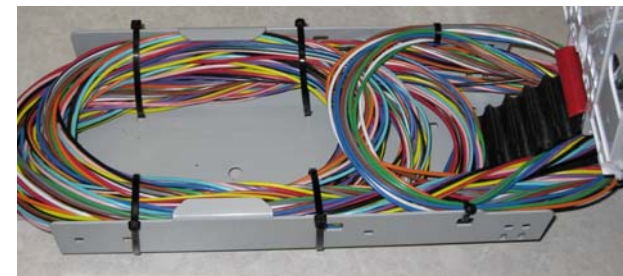


- **Bend Radius:**  $\geq 20X$  the cable dia. during load  
 $\geq 10X$  during static conditions
  - 432f: 0.73" OD = 30" diameter (during tension)
  - Violations can cause **tube compressions/damage or fiber atten./breaks**
  - Watch out for:
    - Manhole & hand hole entry/exits & racking
    - Duct exits
    - Pedestal entrances
    - Aerial pulling angles on pole lines
- **Max. Load:** Do not exceed spec (typically 600lbf)
  - Use Cable Breakaways
- **Use Swivels:** Prevents cable twisting
- **Figure 8 machines:** Not recommended.
  - Don't control bend radius or cable twist (major issue with central tube RSM designs)
- **Installation Temp:** Indoor/outdoor designs have higher minimum temp ratings
- **Pulling Grips:** Over jacket application is OK but may not withstand 600lbf.



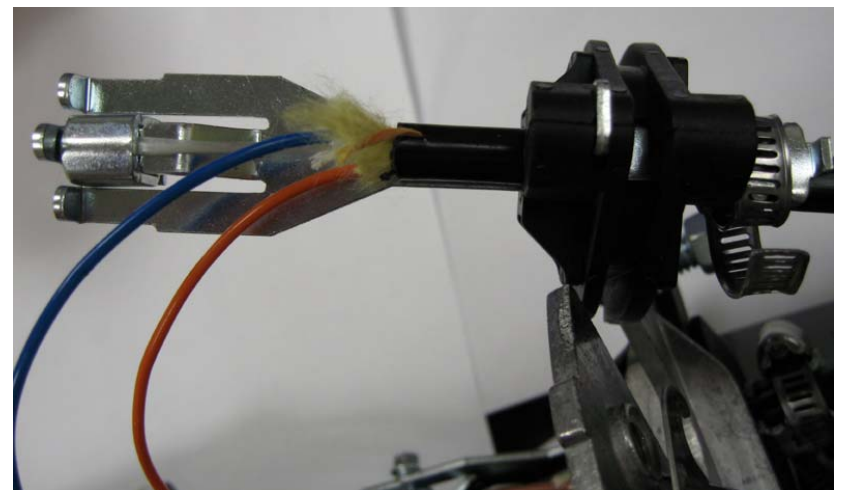
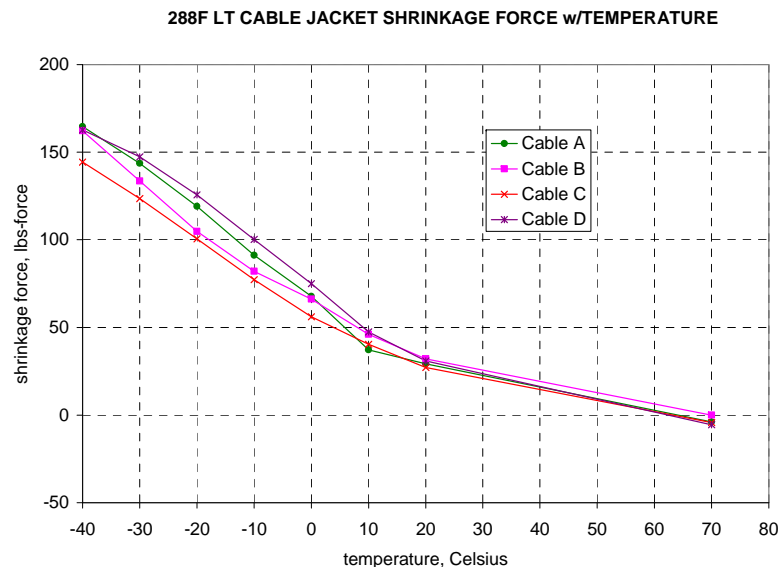


- **Express Tube Storage Length: New RUS cable spec  $\leq 20$  ft**
  - RUS PC2 spec: Expect to be less (e.g. 16'?)
  - Some cables are exempt: Microduct & Drop
  - Excessive tube storage length: May increase loss at low temps
    - RUS spec:  $\leq 0.05$  dB aver. increase,  $\leq 0.1$  dB max. @ -40C @ 1550nm
  - Tube storage space?
  - Don't exceed the Pedestal/Closure Suppliers & Cable Spec
    - Typically specified from 7.5 to 14 feet
    - Higher fiber counts take up more storage space
  - ***Cable installer dictates the length of express tube***
    - Cable loop must be stored somewhere





- **Clamp the CSM & cable/jacket : Required by new RUS PC2**
  - Keep cable components coupled
  - Improper termination: Can increase loss in last 20 ft of cable or in express routed tubes. (reference Telcordia TICL papers)
    - More sensitive with long express routed tubes
  - **CSM clamping**
    - Positive stop recommended: Prevents pistoning
    - Minimize CSM routing angle and length:
      - Minimizes bowing/breaking
  - **Jacket retention: Shrink forces reach 165 lbf at -40C**





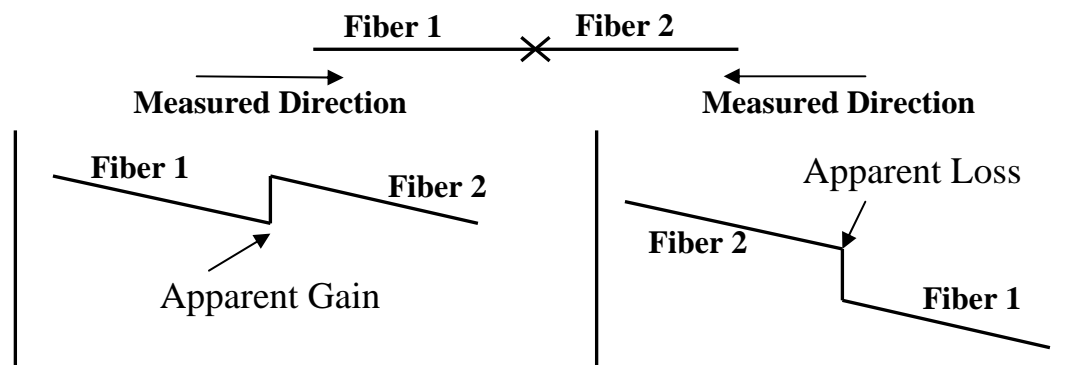
- Follow minimum bend diameter specs
  - Pedestal cable entry points
  - Don't store/loop cable in pedestals
  - Fiber & tube bends:  $\geq$  min. fiber bend radius
    - Flexible tube materials allow bends smaller than the fiber
      - limited to fiber bend radius spec.
    - Some materials (e.g. PBT): More bend/kink sensitive
- Buffer tube removal: Score tube & snap, do not cut through tube



- Midspan entry: Use the proper tool to minimize fiber breaks
- Bonding & grounding: At every closure & building entrance (follow company & local/national rules)

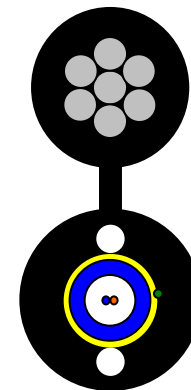
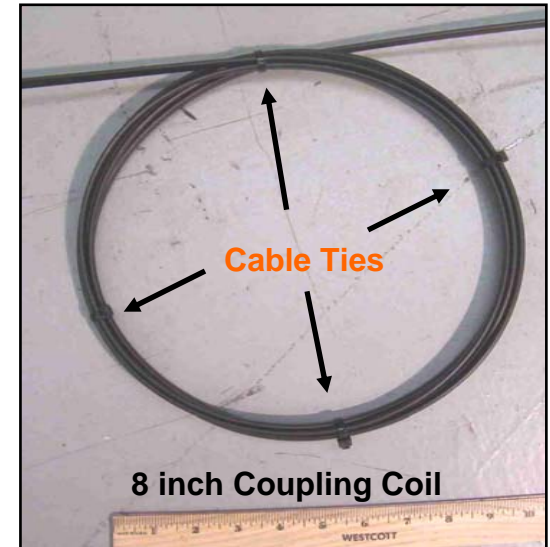


- OTDR: *Bi-directional averaging required for true attenuation*
  - OTDR measures backscattered light
  - Backscatter: can vary from fiber to fiber & down length
  - Bi-directional averaging removes the backscatter variation effects
  - *Splice loss measurement: Bi-directional averaging required*
    - Apparent Gainer/Loss: 2 fibers with different backscatter levels
    - **One Way OTDR: Should not be specified.** Not meaningful.
    - Spec splice loss in the cable spec also.



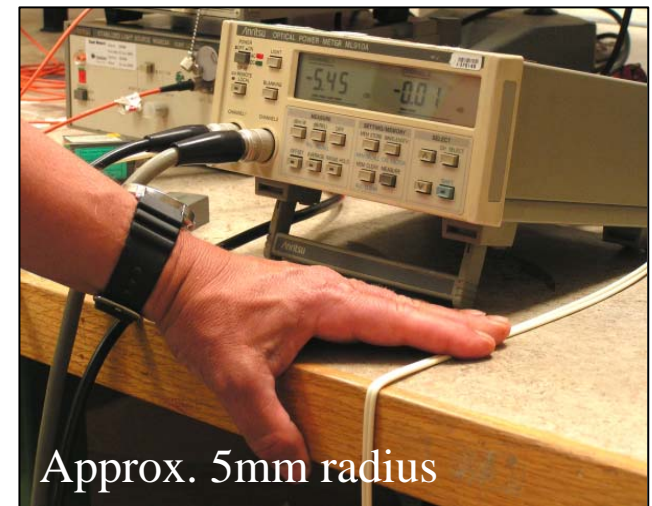


- **Aerial Self Support Central Tube Designs (Flat Drop)**
  - Don't exceed maximum specified span
    - Varies by weather load
  - Wedge clamp does not required cable entry
  - Coupling Coils Required – prevents fiber retraction during storm load
    - Locate between the last cable clamp and splice point
- **Figure 8 Drop**
  - Make sure cable is designed to have messenger removed'
    - Minimize cable contraction & micro bending of fiber
  - Messenger must be exposed to use the cable clamp
  - Coupling coils also required





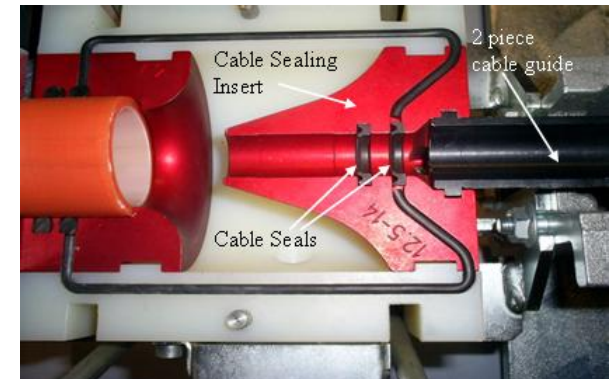
- **Gel Free Cable Designs**
  - Provides benefits in cable prep time
  - Careful consideration in
    - Coastal regions
    - Areas with heavy road salt de-icing
- **Bend Insensitive Fiber: BendBright<sup>XS</sup>**
  - 100 X improvement in bending loss
  - Ideal for Premise applications
  - Spec compliance to both SMF & BIF:  
ITUG652.D & G657.A&B
    - G657A: meets SMF spec G652
    - G657B : tighter bend specs but does not meet SMF specs



Approx. 5mm radius

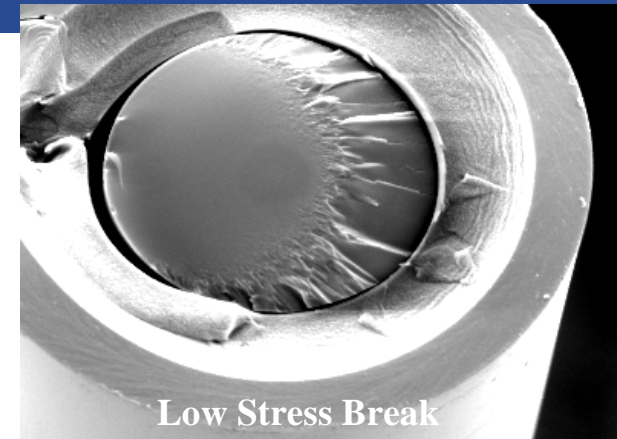


- **Crash test:** Know the max push force
  - Do not over push cable (*cable folding or corkscrewing*)
  - Lower push force may be require for:
    - Smaller diameter cable
    - Lower cable/duct fill ratios
    - Sherman & Reilly: <0.6" cable – 800 lb max hydraulic pressure
- **Seals & guides:** Match the cable diameter
- **4 to 6KF blowing length is typical –**
  - Distance affected by bends & vertical changes
  - Concatenation recommended for longer lengths
  - Birdie method not recommended when concatenating
- **Don't blow too fast.**
  - Extra speed isn't worth the risk for the minor time savings.
- **Don't over tighten the lid**
  - On certain units – Full spring compression may crush the cable
- **Air flow & pressure:** Keep to recommended levels
  - Blow the cable, don't push it.
- **Air cooler:** Use when air temp is over 80F
- **Proof the duct:** Determines clearance
- **Lubricant duct**
- **Keep cable clean:** Minimizes cable slippage





- **Fiber break analysis:**
  - Determine stress level applied (high or low stress break)
  - If there was a twist or a bend during the break
  - If there was coating damage
- **Major Areas of Prevention**
  - Score & snap buffer tube – don't cut through it
  - Care in sliding off tubes
  - Use Proper Midspan Entry Tool
  - Worn coating stripping tools
  - Care in placing fiber splice in tray





- **Cable bend radius & tension violations**
  - CSM damage: splits or breaks
  - Jacket abrasions if pulled across an edge
  - Buffer tube compression or indentations down one side of the cable
- **Prevention**
  - Follow tensile & bend radius specs

