

# 2010

## HALLIBURTON Cabling Standard v 3.0



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# Halliburton Cabling Standard

Date Approved:

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## INTRODUCTION:

This document provides cabling infrastructure specifications required for all Halliburton facilities. This document includes minimum performance criteria for cabling infrastructure components and sub-systems that accommodate Halliburton's present and planned future requirements.

Product specifications, general design considerations, and installation guidelines are detailed in this specification document. Estimated quantities of telecommunications outlets, typical installation details, cabling pathways and outlet types for a specific Halliburton facility will be provided as an attachment to this document. If the bid documents are in conflict, the written specification shall take precedence. The successful vendor shall meet or exceed all requirements for the cabling system described in this document.

Each cabling infrastructure project requires a full Siemon Structured Cabling System. Each installation shall comply with permanent link and channel performance requirements of Category 6 and 6A cabling standards, per ANSI/TIA/EIA-568B.1-May 2001 and subsequent addendums as applicable. The cabling system shall be backed by a 20-Year Performance and Applications Warranty, which requires a Certified Installer of Siemon to perform the installation. The performance warranty shall be facilitated by the Certified Installer and be established between Halliburton and Siemon.

Certified Installers must furnish all labor, supervision, tooling, miscellaneous mounting hardware and consumables for each cabling system installed. Certified Installers shall maintain current status with the warranting manufacturer, including all training requirements, for the duration of the cable infrastructure project. The Certified Installer shall staff each installation crew with the appropriate number of trained personnel, in accordance with their manufacturer/warranty contract agreement, to support the 20-Year Channel Performance Warranty requirements and a full time project manager. After installation, the Certified Installer shall submit all documentation to support the warranty in accordance with the manufacturer's warranty requirements, and to apply for said warranty on behalf of Halliburton. The warranty will cover the components and labor associated with the repair/replacement of any failed link, within the warranty period, that is a valid warranty claim.

## Scope:

Halliburton network cabling will meet or exceed the specifications presented below unless approved in writing by IT Regional/Country Manager.

## General Description:

Halliburton workstations utilize two Category 6 or 6A segments terminated as a standard configuration. Each voice and data circuit requires a Category 6 or 6A 4-pair UTP or F/UTP cable. All cable segments are terminated on a network rack or within an Enclosure. Siemon Category 6 and 6A station and patch cords are required to comply with Siemon channel warranty guarantees.

- *Halliburton Corporate and Major Property Location (MPL's) facilities will have a Cat6A UTP or FUTP solution when specified.*
- *Halliburton Field Sites will have a Cat6 UTP solution.*

## Corporate and MPL Facility Cabling Specification:

Corporate and MPL cabling should be Siemon CAT6a UTP or F/UTP 10 gigabit standard depending on installation guidelines. All cabling should be compliant to fire code, either in a plenum or non plenum environment.

Overhead Siemon plenum cabling is blue in color. IDF racks have angled 24 port patch panels in the equipment distribution areas.

Standard network frames with 10 inch vertical double sided wire managers on each side are used in the network distribution areas and horizontal distribution areas. A 20x6 inch flex tray is used in the plenum for overhead cable flow with a metal divider for fiber backbone. All Infrastructure support material is black in color.

Backbone and Distribution fiber is 8/125 micron Singlemode. Singlemode fiber is used throughout the Facility connecting Network areas to the Main Distribution Area. All segments terminate to an LC type connector.

## Corporate and MPL Product Specifications:

### Horizontal Cable – Approved Part Numbers

Siemon Cat6a UTP	#9C6P4-A5-06-R1A (1000' Reel Plenum)
Siemon Cat6a F/UTP	#9A6P4-A5-06-R1A (1000' Reel Plenum)
Patch Panels	#Z6A-PNLA-24K (UTP) #Z6AS-PNLA-24K (F/UTP)
Face Plates	#10GMX-S04-02
Jacks	#Z6A-02 (UTP) #Z6A-S02 (F/UTP)
Patch Cords	#MC6-8-T-03-04 (3 foot) #MC6-8-T-05-04 (5 foot) #MC6-8-T-07-04 (7 foot) #MC6-8-T-10-04 (10 foot) #MC6-8-T-15-04 (15 foot)

### Backbone Cable – Approved Part Numbers

Siemon Singlemode OSP	#9PE8M024D-E201A (24 strand OSP) #9PEM048G-E201A (48 strand OSP)
Breakout / Fan out Kits	#Installer Preference
Siemon Singlemode indoor armored plenum	#9BC8P024D-E205A (24 strand PLN ILA) #9BC8P048G-E205A (48 strand PLN ILA)
FDC (8 slot fiber cabinet)	#RIC3-48-01
FDC Adapter panel	#RIC-F-LC12-01 (12 strand LC panel)
LC Connectors	#FC1-LC-SM-B02
Patch Cords	#FJ2-LCULCUL-02 (2 meter) #FJ2-LCULCUL-05 (5 meter)

### Racks and Vertical wire management – Approved Part Numbers

CPI Network racks	# 55053-703
CPI 10" Vertical Wire Management	# 35523-703
CPI 2U Horizontal Management	# 35441-702

CPI FlexTray cabling support pathway – Approved Part Numbers	
CPI FlexTray 20" x 6" basket	#34831-720

## Field Site Facility Cabling Specification:

Field Site cabling should be Siemon CAT6 UTP. All cabling should be compliant to fire code, either in a plenum or non plenum environment.

Overhead Siemon plenum cabling is blue in color. IDF racks have 48 port patch panels in the equipment distribution areas.

Standard network frames with 6 inch vertical double sided wire managers on each side are used in the network distribution areas and horizontal distribution areas. A 12x6 inch flex tray is used in the plenum for overhead cable flow with a metal divider for fiber backbone. All Infrastructure support material is black in color.

Backbone and Distribution fiber is 8 micron Singlemode. Singlemode 8 micron fiber is used throughout the Facility connecting Network areas to the Main Distribution Area. All segments terminate to an LC type connector.

### Field Site Facility Product Specifications:

#### Horizontal Cable – Approved Part Numbers

Siemon Cat6 UTP	#9C6P4-E2-06-RXA (1000' Reel Plenum)
Patch Panels	#HD6-48 (UTP 48 port 2U)
Face Plates	#MX-FPS-04-02
Jacks	#MX6-02 (UTP)
Patch Cords	#MC6-8-T-03-04 (3 foot)
	#MC6-8-T-05-04 (5 foot)
	#MC6-8-T-07-04 (7 foot)
	#MC6-8-T-10-04 (10 foot)
	#MC6-8-T-15-04 (15 foot)

#### Backbone Cable – Approved Part Numbers

Siemon Singlemode OSP	#9PE8M024D-E201A (24 strand OSP)
	#9PEM048G-E201A (48 strand OSP)
Breakout / Fan out Kits	#Installer Preference
Siemon Singlemode indoor armored plenum	#9BC8P024D-E205A (24 strand PLN ILA)
	#9BC8P048G-E205A (48 strand PLN ILA)
FDC (8 slot fiber cabinet)	#RIC3-48-01
FDC Adapter panel	#RIC-F-LC12-01 (12 strand LC panel)
LC Connectors	#FC1-LC-SM-B02
Patch Cords	#FJ2-LCULCUL-02 (2 meter)
	#FJ2-LCULCUL-05 (5 meter)

#### Racks and Vertical wire management – Approved Part Numbers

CPI Network racks	# 55053-703
CPI 6" Vertical Wire Management	# 35521-703
CPI 2U Horizontal Management	# 35441-702

CPI FlexTray cabling support pathway – Approved Part Numbers	
CPI FlexTray 12" x 6" basket	#34831-712

## Testing

All cables and termination hardware shall be 100% tested for defects in installation and to verify cable performance under installed conditions. The contractor prior to system acceptance shall verify all conductors of each installed cable useable. Any defect in the cabling system installation including but not limited to cable, connectors, feed through couplers, patch panels, and connector blocks shall be repaired or replaced in order to ensure 100% useable conductors in all cables installed.

All cables shall be tested in accordance with this document, The Siemon Company Certified Installer requirements, and best industry practices. If any of these are in conflict, the Contractor shall be responsible to bring any discrepancies to the attention of the project team for clarification and/or resolution.

## Length

Each horizontal cable shall be tested for installed length using Siemon approved test equipment. The cables shall be tested from patch panel to patch panel, block to block, patch panel to outlet or block to outlet as appropriate. The cable length shall conform to the maximum distances set forth in the ANSI/TIA/EIA-568B.1 standard.

## Performance Verification

Category 6 or 6A data cable shall be performance verified using a Siemon approved tester. This test set shall be capable of testing for the continuity and length parameters defined above, and provide results for the following tests:

- Near End Cross-talk (NEXT)
- Attenuation
- Ambient Noise
- Attenuation to Cross-talk Ratio (ACR)
- Wire Map

Test results shall be automatically evaluated by the equipment, using the most up-to-date criteria from the TIA/EIA Standard and the result shown as pass/fail. Test results shall be printed directly from the test unit or from a download file using an application from the test equipment manufacturer. The printed test results shall include all tests performed, the expected test result and the actual test result achieved. Per Siemon warranty standards, "FAIL" and "\*PASS" results are considered a failed test result. The Contractor must repair or replace circuits that return this test result to "PASS" conditions, at no additional cost to Halliburton.

## Installation Guidelines

- Horizontal cables shall not exceed 90 m (295 ft) from the telecommunications outlets in the work area to the horizontal cross connect.
- Horizontal pathways shall be installed or selected such that the minimum bend radius of horizontal cables is kept within manufacturer specifications both during and after installation.
- In open ceiling cabling, cable supports shall be provided by means that is structurally independent of the suspended ceiling, its framework, or supports. These supports shall be spaced no more than 1.5 m (5 ft) apart. Placement of support systems shall be below red-iron bar joists; supports may be attached to the bottom of the joists. Additionally, support systems shall be installed above HVAC duct systems, sprinkler system plumbing, electrical conduits, etc. The intent is to keep cable pathways as high as possible within the open ceiling environment.
- Telecommunications pathways, spaces and metallic cables, which run parallel with electric power or lighting, which is less than or equal to 480 Vrms, shall be installed with a minimum clearance of 50 mm (2 in).
- The installation of telecommunications cabling shall maintain a minimum clearance of 3 m (10 ft) from power cables in excess of 480 Vrms.
- The Contractor shall observe the bending radius and pulling tension requirements and limitations of the cable during handling and installation.
- Each run of balanced twisted-pair cable between the telecommunications closet and the information outlet shall not contain splices.
- In a false ceiling or suspended ceiling environment, a minimum of twelve (12) inches shall be observed between the cable supports and ceiling tiles where possible. Cables shall be supported in a manner that provides a minimum of twelve (12) inches of clearance between the cable pathway bundles and the ceiling tiles
- All horizontal pathways shall be designed, installed and grounded to meet applicable local and national building and electrical codes.
- The number of horizontal cables placed in a cable support or pathway shall be limited to a number of cables that will not alter the geometric shape of the cables.
- Maximum conduit pathway capacity shall not exceed a 40% fill. However, perimeter and furniture fill is limited to 60% fill for move and changes.
- Horizontal distribution cables shall not be exposed in the work area or other locations with public access.
- A 10-foot service loop is required at the Work Area Outlet location. Cables shall be routed at least five feet beyond the down-wall pathway point, and re-routed back to the down-wall pathway point.
- Each TC/IC/MC patch panel data port shall be patched from patch panel to switch using grey Category 6 stranded Siemon patch cords using the appropriate length while utilizing the vertical and horizontal wire management. Each TC/IC/MC patch panel voice port shall be patched from patch panel to riser patch panel using grey Category 6 stranded Siemon patch cords using the appropriate length while utilizing the vertical and horizontal wire management. Each end of the patch cord will be electronically labeled switch port or patch panel port according to the opposite end.

## Grounding and Bonding

The facility shall be equipped with a Telecommunications Bonding Backbone (TBB). This backbone shall be used to ground all telecommunications cable shields, equipment, racks, cabinets, raceways, and other associated hardware that has the potential for acting as a current carrying conductor, including armored fiber. The TBB shall be installed independent of the buildings electrical and building ground and shall be designed in accordance with the recommendations contained in the TIA/EIA-607 Telecommunications Bonding and Grounding Standard.

The main entrance facility/equipment room in each building shall be equipped with a telecommunications main grounding bus bar (TMGB). Each telecommunications closet shall be provided with a telecommunications ground bus bar (TGB). The TMGB shall be connected to the building electrical entrance grounding facility. The intent of this system is to provide a grounding system that is equal in potential to the building electrical ground system. Therefore, ground loop current potential is minimized between telecommunications equipment and the electrical system to which it is attached.

## Product Specifications

All racks, metallic backboards, cable sheaths, metallic strength members, splice cases, cable trays, etc. entering or residing in the TC or ER shall be grounded to the respective TGB or TMGB using a minimum #6 AWG stranded copper bonding conductor and compression connectors. Where metallic panels attached to the rack do not have sufficient metal to metal contact to provide an adequate path to ground, they shall be bonded to the rack using a minimum #14 AWG copper conductor. The copper conductor size shall be upgraded based on the largest power conductor feeding any rack mount equipment. The conductor shall be continuous; attaching all isolated components in a daisy chain fashion from top to bottom and bonded to the rack using an appropriate compression connector.

All wires used for telecommunications grounding purposes shall be identified with a green insulation. Non-insulated wires shall be identified at each termination point with a wrap of green tape. All cables and bus bars shall be identified and labeled in accordance with the System Documentation Section of this specification.

## Installation

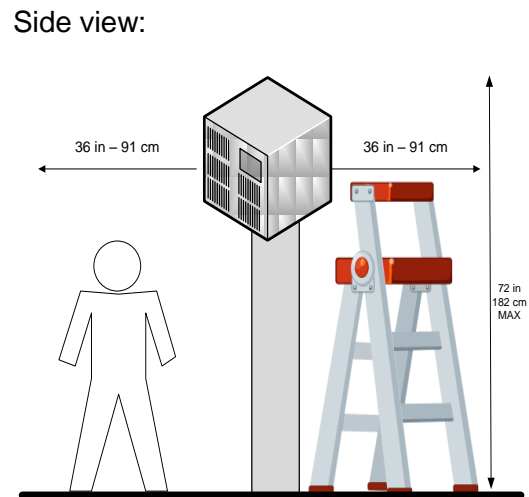
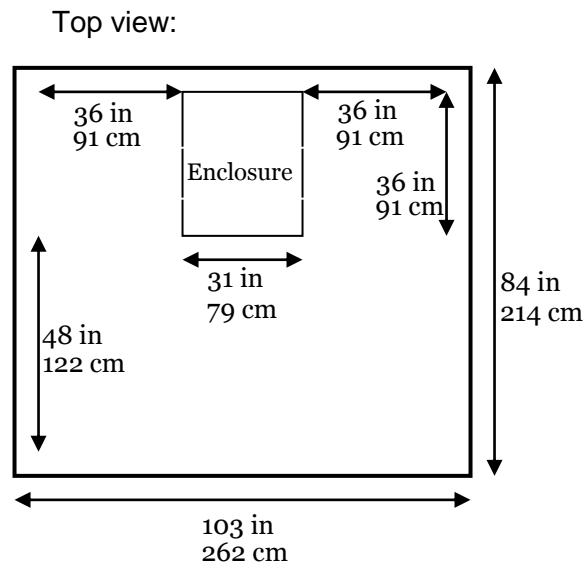
The TBB shall be designed and/or approved by a qualified PE, licensed (actual or reciprocal) in the state that the work is to be performed. The TBB shall adhere to the recommendations of the TIA/EIA-607 standard, and shall be installed in accordance with best industry practices. A licensed electrical contractor shall perform installation and termination of the main bonding conductor to the building service entrance ground, at a minimum.



## Quick Reference Guide

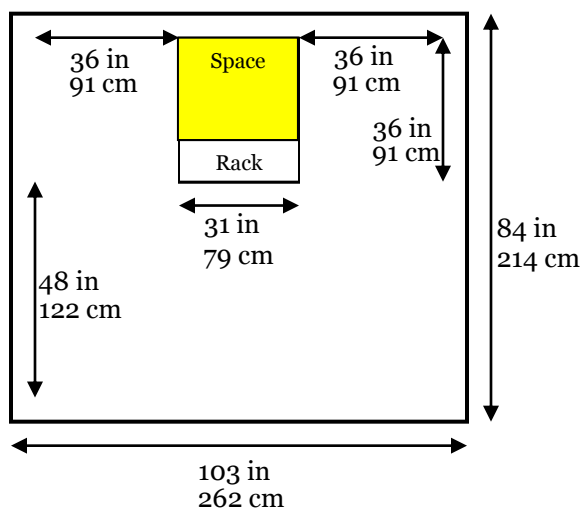
### Size planning:

1. Number of network segments is the driving factor
2. Less-than 96 segments = Small structure enclosure.
  - a. Allow adequate clearance around the enclosure
  - b. Ladder access needed for wall-mounted option
  - c. Dedicated room preferred

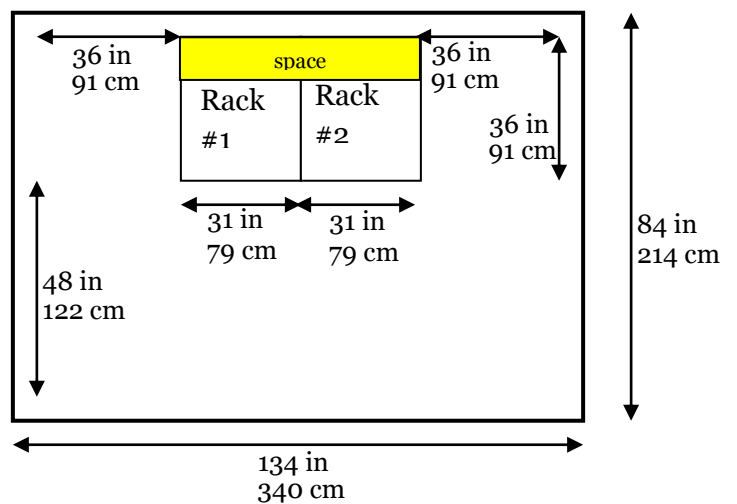


3. 96 segments or more = Large structure racks
  - a. Plan for the number of racks in the closet
  - b. Add additional racks beside the first one
  - c. Max of 276 segments in one rack

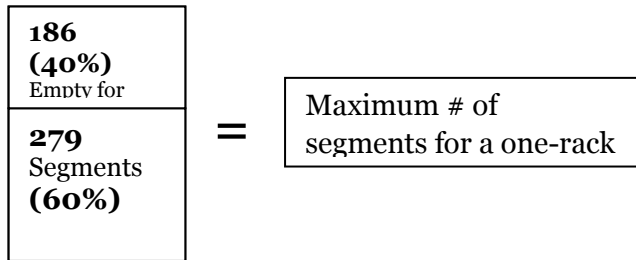
A network closet with **one rack**:



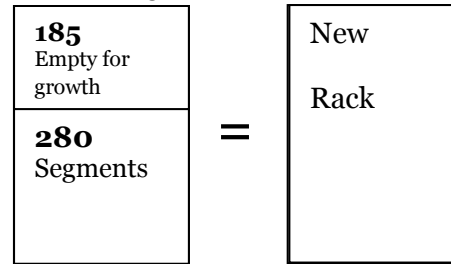
A network closet with **two racks**:



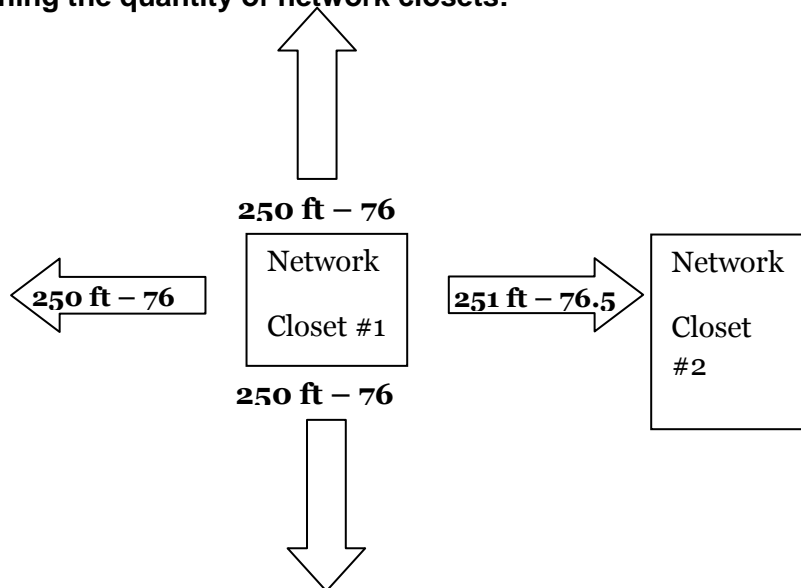
The max allowed for a **one-rack closet**:



The “tipping point” for a **two-rack closet**:



**Determining the quantity of network closets:**



**Location of network closets:**

1. Centrally located
2. Vertically aligned for multi-story buildings
3. Away from water pipes

**Electrical power (US) requirements (large structure)** for one network rack are as follows:

1. One dedicated, 50 amp, 3-pole, 208v circuit hardwired directly to the UPS
2. Two dedicated “twist-lock” L6-20 circuits 110v
3. Two dedicated quad 5-20 110v outlets
4. Items 1 & 2 are typically installed on the back side of the Vertical wire manager section of the switch rack.

**Electrical power (US) requirements for a small structure** is to have one dedicated quad 5-20 110v outlet.

**Ventilation and cooling for a large structure:**

1. Temperature ~ 65 degrees F (18 degrees C)
2. Humidity ~ 50%
3. One ton AC per rack
4. Walls run “to deck”

**Ventilation and cooling for a small structure:**

1. Ventilation handled by the enclosure
2. Ambient temperature should not exceed 80 degrees F (26 degrees C)

## Example pictures of network equipment and configurations

### Large Structures:

A large-structure network closet with two (2) racks:



Electrical power outlets in a large-structure network rack:



### Small Structures:

A small network cabinet or enclosure:



## Additional equipment planning factors

### Small Structures:

Additional considerations for the enclosures in a small structure are as follows:

1. Enclosure product data sheet from a manufacturer (The vendor listed as a recommendation. A quality product from another vendor will suffice provided it is a truly equivalent product) -[http://www.chatsworth.com/uploadedFiles/Files/cube-it\\_datasheet.pdf](http://www.chatsworth.com/uploadedFiles/Files/cube-it_datasheet.pdf)
2. Size Option (Enclosure needs to be able to house the components listed in item #3):
  - a. CPI 36" high Cabinet = 11900-736
  - b. CPI 48" high Cabinet = 11900-748
3. Internal components that also need to be ordered (part numbers are from Chatsworth):
  - a. Fan Kit = 12804-701
  - b. Filter Kit = 12805-701
  - c. Power Strip = 12820-705
  - d. Light Kit = 12803-701