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ITEM 632 INTERCONNECT CABLE. MISC.: 12 FIBER. TIGHT BUFFERED. HYBRID (CONTINUED)

- FIBER OPTIC CABLE PACKING, MARKING AND SHIPPING SHALL COMPLY WITH SECTION 7.0 OF IMSA GENERAL SPECIFICATION 70. IN ADDITION TO SECTION 7.1, THE FIBER COUNT LABEL SHALL ALSO INCLUDE A REFERENCE TO THE NUMBER OF EACH TYPE OF FIBER: AN ACCEPTABLE EXAMPLE WOULD BE TO LABEL A HYBRID CABLE 8 MM/4 SM TO INDICATE THE CABLE IS COMPRISED OF 8 MULTI-MODE FIBERS AND 4 SINGLE MODE FIBERS.
- PER IMSA GENERAL SPECIFICATION 70, ALL FIBER OPTIC CABLE TO BE USED AS PART OF THE TRAFFIC SIGNAL SYSTEM SHALL BE RATED FOR OUTDOOR USE UNLESS SPECIFICALLY NOTED IN THE PLANS.
- IN ADDITION TO IMSA GENERAL SPECIFICATION 70, FIBER OPTIC CABLE RIP CORDS SHALL BE MADE FROM EITHER STANDARD TELĆO NYLON MATERIAL OR FROM BRAIDED KEVLAR. NO UN-BRAIDED KEVLAR WILL BE ACCEPTED.

TIGHT BUFFERED CABLE

WHEN TIGHT BUFFERED CABLE IS SPECIFIED THE FOLLOWING METHOD OF INSTALLATION SHALL BE USED. THE TRUNK CABLE SHALL BE ROUTED DIRECTLY INTO EACH CONTROLLER CABINET WHERE ALL 12 FIBERS SHALL BE PROVIDED WITH A CONNECTOR AND TERMINATED INTO A SPECIFIED TERMINATION PANEL. A FOUR FIBER PATCH CORD SHALL BE INSTALLED BETWEEN THE TERMINATION PANEL AND THE FIBER OPTIC TRANSCEIVER. THE INTENT IS TO BE ABLE TO QUICKLY AND EASILY SWITCH FIBER CHANNELS IN CASE OF A BROKEN FIBER OR IF ADDITIONAL DEVICES SUCH AS CAMERAS NEED TO BE ADDED IN THE FUTURE. A MINIMUM OF 15 FEET (5 METERS) SLACK CABLE SHALL BE PROVIDED IN THE CONTROLLER CABINET. SLACK CABLE SHALL BE NEATLY COILED AND BOUND TO THE CABINET VIA TIE WRAP OR OTHER APPROVED MEANS. AT NO TIME SHALL THE MINIMUM FIBER BEND RADII BE VIOLATED. NOTE: TIGHT BUFFERED CABLES ROUTED DOWN THROUGH A POLE FROM AERIAL INTERCONNECT SHALL BE PROVIDED WITH STRAIN RELIEF (CABLE SUPPORT ASSEMBLY) PER THE INSTALLATION DETAILS. COST OF THE CABLE SUPPORT ASSEMBLY SHALL BE INCIDENTAL TO THE BID ITEM PRICE OF THE CABLE. COST FOR CONNECTORS ON THE FIBER OPTIC CABLE SHALL BE ITEMIZED SEPARATELY EXCEPT FOR THE PATCH CORD CONNECTORS WHICH ARE INCIDENTAL TO THE PATCH CORD.

ITEM 632 INTERCONNECT MISC .: FIBER OPTIC PATCH CORD. 4 FIBER A FOUR FIBER PATCH CORD SHALL BE PROVIDED BETWEEN THE FIBER OPTIC TRANSCEIVER AND THE TERMINATION PANEL. THE FIBERS SHALL BE EITHER MULTI-MODE OR SINGLE MODE AS REQUIRED TO MATCH THE TRUNK CABLE. COST FOR THE PATCH CORD SHALL BE AT THE BID ITEM PRICE FOR EACH ITEM 632 INTERCONNECT MISC.: FIBER OPTIC PATCH CORD, 4 FIBER. PATCH CORD CONNECTORS SHALL BE SC/PC TYPE AND SHALL BE ATTACHED USING AN EPOXY CRIMPED METHODOLOGY WHERE THE KEVLAR IS CRIMPED TO THE CONNECTOR. COST FOR SUPPLYING AND INSTALLING CONNECTORS ON ALL ENDS OF THE PATCH CORD SHALL BE INCIDENTAL TO THE BID ITEM PRICE OF THE PATCH CORD.

ITEM 632 INTERCONNECT MISC .: TERMINATION PANEL TERMINATION PANELS USED IN NEMA CABINETS SHALL BE A MODEL WCH-04P AS MANUFACTURED BY SIECOR. THE NEMA CABINET TERMINATION PANEL SHALL BE ATTACHED TO THE SIDE OF THE CABINET IN A PLACE THAT PROVIDES MOST ROOM FOR MAKING CONNECTIONS. AFTER ATTACHING THE TERMINATION PANEL ON THE WALL OF THE CABINET OR SUPPORT MEMBER, NO SHARP OBJECTS SUCH AS SCREWS SHALL PROTRUDE OUTSIDE OF THE CABINET THAT MIGHT CAUSE INJURY TO PEDESTRIANS. TERMINATION PANELS USED IN 170 CABINETS SHALL BE MOUNTED WITHIN THE 19" (483 MM) CAGE AND SHALL BE MODEL CCHO2U AS MANUFACTURED BY SIECOR. ALL COSTS INCLUDING MATERIALS, TOOLS AND LABOR TO PROVIDE AND INSTALL A TERMINATION PANEL SHALL BE INCLUDED IN THE BID ITEM PRICE FOR EACH ITEM 632 INTERCONNECT MISC .: TERMINATION PANEL.

ITEM 632 INTERCONNECT. MISC.: FIBER OPTIC CONNECTOR.SC/PC FIBER OPTIC CONNECTORS SHALL BE FIELD INSTALLABLE SC/PC COMPATIBLE, CERAMIC FERRULE, WITH THE FIBER PERMANENTLY SECURED WITHIN THE FERRULE BY ÉPOXY (HEAT SÉT) OR A HOT MELT ADHESIVE IN ACCORDANCE WITH WITH THE CONNECTOR AND/OR THE EPOXY MANUFACTURER. WHEN CONNECTORS ARE INSTALLED OUTSIDE OF A CONTROLLED ENVIRONMENTAL LOCATION, THE CONNECTOR OPERATING TEMPERATURE SHALL BE MINIMUM -40 C TO +70 C. FOR THOSE APPLICATIONS WITHIN A CONTROLLED ENVIRONMENTAL LOCATION, THE OPERATING TEMPERATURE SHALL BE MINIMUM -20 C TO +60 C.

THE PROCEDURE FOR THE TERMINATION OF SC/PC CONNECTORS USED ON THIS PROJECT SHALL MEET THAT PROCESS SET OUT IN THE CONNECTOR MANUFACTURER'S STANDARD OPERATING PROCEDURE (SOP) FOR FIELD INSTALLATION. THIS SOP SHALL BE SUBMITTED FOR APPROVAL TO THE ENGINEER. UNLESS RECOMMENDED OTHERWISE BY THE CONNECTOR MANUFACTURER, EACH FIBER SHALL BE CLEAVED, CLEANED AND RECEIVE MULTIPLE POLISHINGS WITH INCREASINGLY FINE GRIT POLISHING PADS. THE APPROVED SOP WILL BE THE BASIS FOR INSPECTION.

THE AVERAGE LOSS FOR MATED PAIRS OF CONNECTORS SHALL NOT EXCEED .2 DB FOR BOTH SINGLE AND MULTI-MODE FIBERS.

PAYMENT SHALL BE MADE AT THE CONTRACT UNIT PRICE BID PER EACH OF ITEM 632, INTERCONNECT, MISC.: FIBER OPTIC CONNECTOR.

ITEM 632 INTERCONNECT, MISC.: CLEAVE TOOL CLEAVE TOOLS ARE USED DURING SPLICING TO CUT THE INDIVIDUAL SM OR MM FIBERS AS CLOSE TO A PERFECT 90 DEGREE ANGLE AS POSSIBLE, THUS ALLOWING THE HIGHEST CORE TO CORE ALIGNMENT AND THEREFORE THE LOWEST DB SPLICE LOSS.

THE MANUFACTURERS OF CLEAVE TOOLS HAVE ESTABLISHED "END ANGLE" CLEAVE AVERAGES THAT ARE BASED ON A MINIMUM OF 150 CUTS UTILIZING A MINIMUM OF 10 CUTTERS. BASED ON THESE TEST RESULTS CLEAVE TOOLS SHALL HAVE MINIMUM END ANGLE AVERAGES AS FOLLOWS: <0.70 DEGREE AVERAGE WITH NO CUT OF THE 150 CLEAVES EXCEEDING 1.5 DEGREE WILL BE ALLOWED. PRIOR TO THE SPLICING OF ANY FIBER CABLE, THE CONTRACTOR SHALL SUBMIT THE PART NUMBER AND MANUFACTURER OF THE CLEAVE TOOL ALONG WITH AN "END ANGLE" DISTRIBUTION CHART WHICH DEMONSTRATES THE ACTUAL 150 CUT END ANGLES, SUCH AS SIECOR PART NUMBER FBC-005 OR ALCOA FUJIKURA CO12 OR EQUAL. THE CONTRACTOR SHALL PURCHASE A CLEAVE TOOL THAT MEETS THIS SPECIFICATION TO BE LEFT IN GOOD WORKING CONDITION WITH THE MAINTAINING AGENCY FOR MAINTENANCE OF THE FIBER SYSTEM.

PAYMENT SHALL BE MADE AT THE CONTRACT UNIT PRICE BID PER EACH OF ITEM 632, INTERCONNECT, MISC.: CLEAVE TOOL.

ITEM 632 INTERCONNECT. MISC .: MECHANICAL SPLICE TOOL KIT A MECHANICAL SPLICE TOOL KIT SHALL INCLUDE ALL THE TOOLS NECESSARY FOR THE ASSEMBLY OF A MECHANICAL SPLICE USING SC/PC COMPATIBLE CONNECTORS. THE TOOLS SHALL ALLOW FOR EASY COMPLETION OF CABLE PREPARATION, REMOVAL OF FIBER COATING, CLEANING AND CLEAVING, PRIOR TO COMPLETING THE SPLICE.
MECHANICAL SPLICE KITS TYPICALLY INCLUDE A CONNECTOR ASSEMBLY TOOL, CLEAVE TOOL, NO-NIK FIBER STRIPPER, MICRO-STRIP PRECISION STRIPPER, CABLE STRIPPER, TELECOMMUNICATION SNIPS, 20X MAGNIFIER, LINT- FREE CLOTH, CARRYING CASE AND MANUAL.

A CLEAVE TOOL SHALL BE INCLUDED IN THE MECHANICAL SPLICE KIT IN ADDITION TO THE ONE WHICH WILL BE PURCHASED SEPARATELY. THE CONTRACTOR SHALL PURCHASE A PRE-ASSEMBLED MECHANICAL SPLICE KIT THAT MEETS THIS SPECIFICATION, SIMILAR TO 3M 2530 FIBER SPLICE PREPARATION KIT OR EQUAL, TO BE LEFT IN GOOD WORKING CONDITION WITH THE MAINTAINING AGENCY FOR MÁINTENANCE OF THE FIBER SYSTEM.

PAYMENT SHALL BE MADE AT THE CONTRACT UNIT PRICE BID PER EACH OF ITEM 632, INTERCONNECT, MISC.: MECHANICAL SPLICE TOOL KIT.

ITEM 632 INTERCONNECT. MISC.: FIBER OPTIC TERMINATION TOOL KIT. SC/PC A TERMINATION TOOL KIT SHALL INCLUDE ALL TOOLS AND MATERIALS LISTED BELOW NECESSARY TO TERMINATE THE SC/PC COMPATIBLE CONNECTORS. TERMINATION KITS SHALL INCLUDE A HOT MELT OVEN, CRIMP TOOL, ONE-STEP LAP FILM, POLISHING JIG, POLISHING PAD, COOLING STAND, CONNECTOR HOLDER, STRIPPING COLLAR, SCRÍBE CARBIDE, BOTTLE OF ISOPROPÝL ALCOHOL, SNIPS, CABLE STRIPPER, NÓ-NIK STRIPPER, VIEW SCOPE, LINT-FREE CLOTH AND PIPE CLEANERS, JEWELERS LOUPE, POCKET RULER AND INSTRUCTION MANUALS. THE CONTRACTOR SHALL PURCHASE A PRE-ASSEMBLED TERMINATION TOOL KIT THAT MEETS THIS SPECIFICATION, SIMILAR TO 3M 6150-A TERMINATION KIT OR EQUAL, TO BE LEFT IN GOOD WORKING CONDITION WITH THE MAINTAINING AGENCY FOR MAINTÉNANCE OF THE FIBER SYSTEM. THE ENTIRE KIT SHALL COME IN A HARD SIDE CARRYING CASE.

PAYMENT SHALL BE MADE AT THE CONTRACT UNIT PRICE BID PER EACH OF ITEM 632, INTERCONNECT, MISC.: FIBER OPTIC TERMINATION TOOL KIT SC/PC.

ITEM 632 INTERCONNECT. MISC.: OPTICAL TIME DOMAIN REFLECTOMETER (OTDR) THE OPTICAL TIME DOMAIN REFLECTOMETER (OTDR) SHALL BE CAPABLE OF TESTING SINGLE-MODE AND MULTIMODE FIBERS AS REQUIRED IN ITEM 632 SIGNALIZATION, MISC.: FIBER OPTIC CABLE TESTING, OTDR. THE OTDR SHALL PROVIDE IMMEDIATE REPORT DISPLAYS AND THE ABILITY TO GRAPH, PRINT AND MAGNETICALLY STORE TEST DATA. THIS ITEM INCLUDES ALL EQUIPMENT NECESSARY TO OPERATE THE OTDR IN LABORATORY AND FIELD CONDITIONS. THE CONTRACTOR SHALL PURCHASE AN OTDR THAT MEETS THIS SPECIFICATION, SIMILAR TO SIECOR OTDR PLUS OR EQUAL, TO BE LEFT IN GOOD WORKING CONDITION WITH THE MAINTAINING AGENCY FOR MAINTENANCE OF THE FIBER SYSTEM.

PAYMENT SHALL BE MADE AT THE CONTRACT UNIT PRICE BID PER EACH OF ITEM 632, INTERCONNECT, MISC.: OPTICAL TIME DOMAIN REFLECTOMETER (OTDR).

