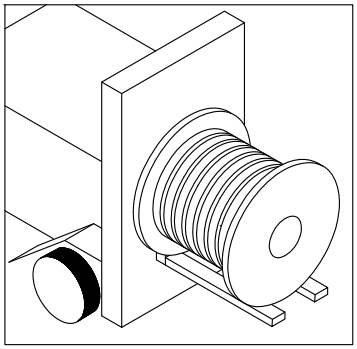
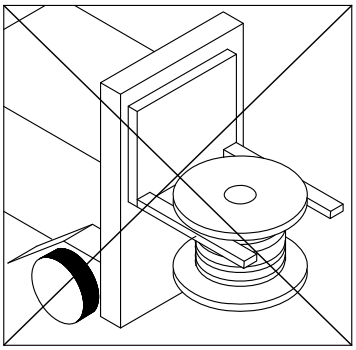
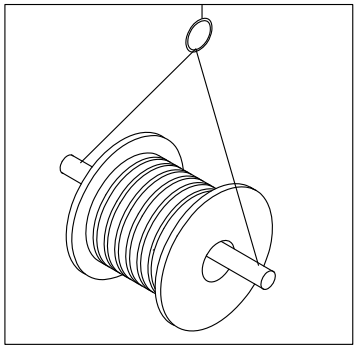
HOW TO HANDLE CABLE REELS



CRADLE BOTH REEL FLANGES BETWEEN FORKS.

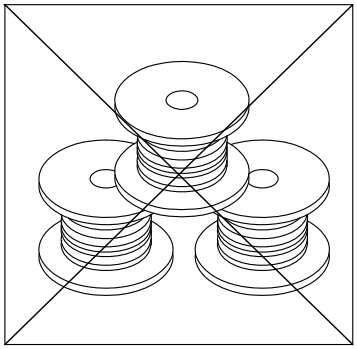


DO NOT LIFT BY TOP FLANGE. CABLE OR REEL WILL BE DAMAGED.



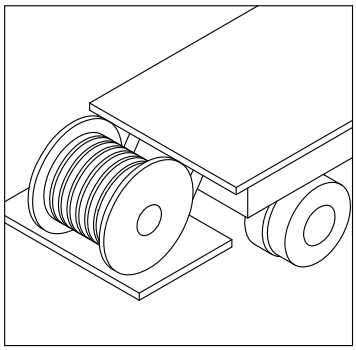
REELS CAN BE HOISTED WITH A SHAFT EXTENDING THROUGH BOTH FLANGES.

← YES

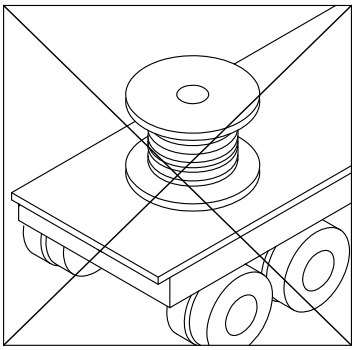


UPENDED HEAVY REELS WILL OFTEN ARRIVE DAMAGED. REFUSE OR RECEIVE SUBJECT TO INSPECTION FOR HIDDEN DAMAGE.

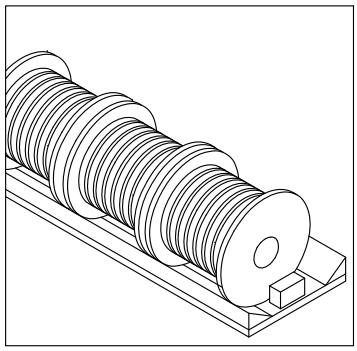
NO →



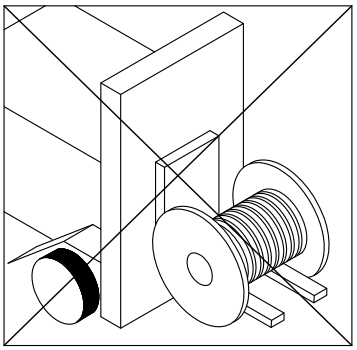
LOWER REELS FROM TRUCK USING HYDRAULIC GATE, HOIST OR FORK LIFT. (LOWER CAREFULLY)



DO NOT UPEND REELS



ALWAYS LOAD WITH FLANGES ON EDGE AND CHOCK AND BLOCK SECURELY.



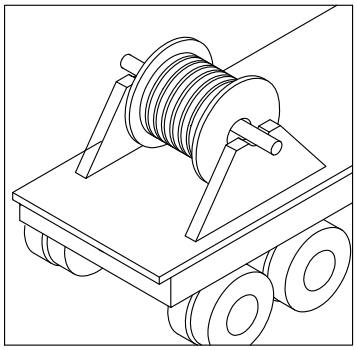
NEVER ALLOW FORKS TO TOUCH CABLE SURFACE OR REEL WRAP.

Clark Public Utilities

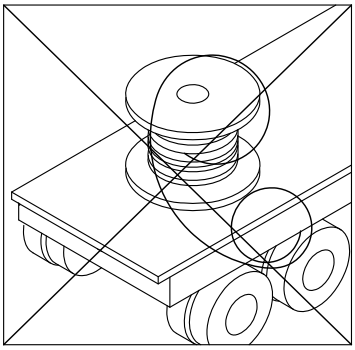
CONSTRUCTION STANDARDS

UNDERGROUND CABLE
REEL HANDLING

HOW TO HANDLE CABLE REELS

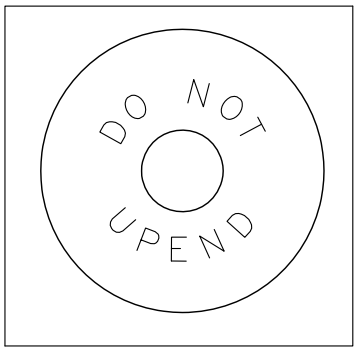


REELS GOING TO JOBS SHALL ALWAYS BE MOUNTED ON A HORIZONTAL AXLE.

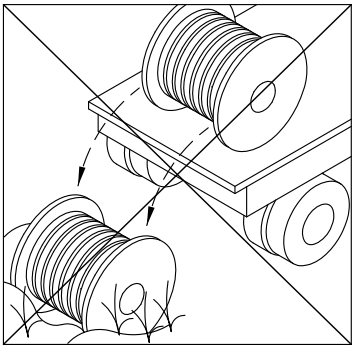


NEVER REMOVE CABLE FROM A REEL THIS WAY. IT WILL KINK.

YES

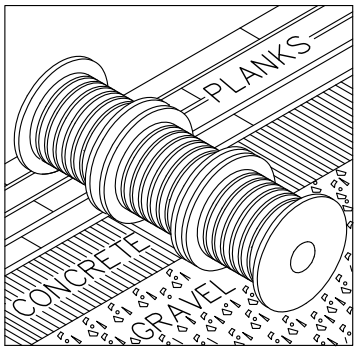


THIS SIGN APPLIES FOR ANY REEL HANDLING. NOT JUST FACTORY DELIVERY.

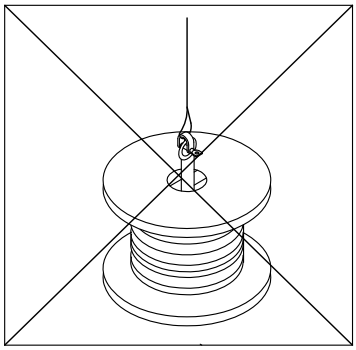


NEVER DROP A CABLE REEL FROM ANY HEIGHT WITH EVEN A SMALL AMOUNT OF CABLE ON THE REEL.

NO



ALWAYS STORE REELS ON A HARD SURFACE.



NEVER USE A SWIVEL TO REMOVE CABLE FROM A REEL.

Clark Public Utilities

CONSTRUCTION STANDARDS

UNDERGROUND CABLE
REEL HANDLING

PAGE:		CAD FILE:	
2 of 2	UCH–0	UCH–0	UCH-0 SSection 1300 - Underground Cable Last updated: 12/2012

MOVEMENT, STORAGE, AND HANDLING OF CABLE

MOVEMENT OF REELS OF CABLE

1. REELS OF CABLE MUST NOT BE DROPPED FROM ANY HEIGHT, PARTICULARLY FROM TRUCKS OR OTHER TRANSPORTING EQUIPMENT.

2. LIFT REELS USING FOLLOWING METHODS:

   A) CRANE OR BOOM TYPE EQUIPMENT--INSERT SHAFT (HEAVY ROD OR PIPE) THROUGH REEL HUBS AND LIFT WITH SLINGS ON SHAFT, PREFERABLY UTILIZING SPREADER OR YOKE TO REDUCE OR AVOID SLING PRESSURE AGAINST REEL HEAD.

   B) FORK LIFT TYPE OF EQUIPMENT MAY BE USED TO MOVE SMALLER, NARROWER WIDTH REELS. FORK TINES SHALL BE PLACED SO THAT LIFT PRESSURE IS ON REEL HEADS, NOT ON CABLE, AND MUST REACH ALL THE WAY ACROSS REELS SO LIFT IS AGAINST BOTH REEL HEADS.

3. REELS MAY BE MOVED SHORT DISTANCES BY ROLLING. REELS SHOULD BE ROLLED IN THE DIRECTION INDICATED BY ARROWS PAINTED ON REEL HEADS. SURFACES OVER WHICH THE REELS ARE TO BE ROLLED SHALL BE FIRM, CLEAR OF DEBRIS, AND ALSO CLEAR OF PROTRUDING STONES, HUMPS, ETC. WHICH MIGHT DAMAGE THE CABLE IF THE REEL STRADDLED THEM.

STORAGE OF REELS OF CABLE

1. CABLE ENDS ARE SEALED PRIOR TO SHIPMENT, IF FACTORY SEALS ARE CUT OFF, NEW SEALS MUST BE APPLIED TO PREVENT MOISTURE ENTRY INTO CABLE.

2. WHENEVER POSSIBLE, THE FACTORY APPLIED PROTECTIVE COVER SHOULD BE LEFT IN PLACE UNTIL REMOVAL IS ABSOLUTELY NECESSARY. ADDITIONAL COVERING SUCH AS TARPAULIN, PLASTIC SHEETING, ETC., MAY BE USED IF CABLE IS TO BE STORED FOR LONG PERIODS OUTDOORS OR IN EXCESSIVELY DIRTY, DUSTY AREAS.

3. STORE REELS OF CABLE ON A FIRM SURFACE, PAVED IF POSSIBLE, OR ON PLANKING TO PREVENT SETTLING INTO SOFT GROUND.

4. THE STORAGE AREAS SHALL HAVE GOOD DRAINAGE.

5. USE FENCING OR OTHER BARRIERS TO PROTECT CABLES AND REELS AGAINST DAMAGE BY VEHICLES OR OTHER EQUIPMENT MOVING ABOUT IN THE STORAGE AREA.

6. NEVER STORE REELS ON END.

HANDLING DURING INSTALLATION

1. COLD WEATHER HANDLING AND PULLING–IN CABLE CAN BE MORE DIFFICULT, DEPENDING ON THE CABLE CONSTRUCTION AND INSTALLATION LOCATION. COLD–INDUCED STIFFNESS OF CABLE MUST BE CONSIDERED ALONG WITH RADIUS AND NUMBER OF BENDS IN THE PROPOSED INSTALLATION RUN.

   IN GENERAL MOST CABLES CAN BE SAFELY HANDLED WITHOUT DAMAGE IF NOT SUBJECTED TO TEMPERATURE LOWER THAN 10°F (–12°C) IN THE 24 HOUR PERIOD PRECEDING PULLING AND BENDING. IF IT IS ANTICIPATED THAT STORE TEMPERATURES WILL BE BELOW THIS LEVEL DURING THE 24 HOUR PRE–PULL PERIOD, ARRANGEMENTS SHOULD BE MADE TO MOVE THE REEL, AVOIDING IMPACT, TO A WARMER AREA. IF NO INDOOR WARMING AREA IS AVAILABLE, A PLASTIC SHEETING–COVERED SHELTER MAY BE CONSTRUCTED AND HEATED. THE REEL SHOULD BE HELD IN THE WARM STORAGE AREA AT A TEMPERATURE OF AT LEAST 60°F (16°C) FOR 24 HOURS TO ENSURE TOTAL WARMUP. APPLY PULLING EYES OR GRIPS WHILE CABLE IS IN THE WARMING AREA, PRIOR TO MOVEMENT OUTDOORS OR UNCOVERING.

2. FACTORY APPLIED SEALS ON CABLE ENDS MAY BE DISRUPTED DURING THE PULLING OPERATIONS AND, THEREFORE, SHOULD BE CHECKED AND REPLACED IF THE CABLES ARE NOT GOING TO BE SPLICED OR TERMINATED RIGHT AFTER PULL–IN. THIS IS ESPECIALLY IMPORTANT FOR UNDERGROUND RUNS WHERE CABLE ENDS MAY BE LEFT IN ENCLOSURES WHICH ARE SUBJECT TO FLOODING.

3. THE CABLES SHOULD BE LAID INTO THE TRENCH BEING CAREFUL NOT TO TWIST OR KINK THEM. CARE SHOULD BE TAKEN NOT TO ABRADE OR IMPACT THE CABLE SURFACE AS IT LEAVES THE PAY–OFF EQUIPMENT AND ENTERS THE TRENCH. OVER–BENDING THE CABLE TO A POINT LESS THAN THE RECOMMENDED MINIMUM BENDING RADIUS ALSO SHALL BE AVOIDED. CABLES CAN BECOME EASILY OVER–BENT AT GUIDE POINTS SUCH AS SMALL SHEAVES OR ROLLERS LOCATED ON THE CABLE LAYING EQUIPMENT.

   AFTER LAYING THE CABLES INTO THE TRENCH, THEY SHOULD BE COVERED WITH A LAYER OF SELECTED BACKFILL TO A LEVEL OF APPROXIMATELY THREE TO FOUR INCHES ABOVE THE CABLES' SURFACES. "SELECTED BACKFILL" IS DEFINED AS EITHER THERMAL SAND OR SAND–CLAY–GRAVEL MIXTURE CONTAINING SOME SMALL STONES NO GREATER IN SIZE THAN ONE–QUARTER TO ONE–HALF INCH ACROSS AT THEIR LARGEST DIMENSION.

FOLLOWING ARE THE MINIMUM REQUIREMENTS FOR ANY CABLE PULL:

1. THE ENTIRE CONDUIT LENGTH INCLUDING BENDS AND RISERS SHALL BE CLEAN AND SMOOTH. THE TOTAL NUMBER OF ANGLES SHALL NOT EXCEED 270° ✲ WITHOUT PRIOR CPU ENGINEERING APPROVAL.

2. THE ENTIRE CONDUIT LENGTH INCLUDING BENDS AND RISERS SHALL BE SECURED IN THE FINAL LOCATION WITH ALL ACCESSORIES FIRMLY ATTACHED.

3. A PULLING TENSION CALCULATION SHALL BE COMPLETED TO ASSURE THAT MAXIMUM TENSION LIMITS WILL NOT BE EXCEEDED. SEE TABLE 1 FOR LIMITS.

4. SUFFICIENT APPROVED CABLE LUBRICANT SHALL BE USED AT THE START OF THE PULL.

5. THE CABLE SHALL NEVER BE BENT TO A RADIUS LESS THAN 12 TIMES THE CABLE DIAMETER. ALL SHEAVES SHALL HAVE A GROOVE DIAMETER OF NOT LESS THAN 24 TIMES THE CABLE DIAMETER.

6. NEVER ALLOW CABLE TENSION AT THE CABLE REELS. THE REELS SHALL BE TURNED BY HAND OR BY A POWER DEVICE SO THAT THE CABLE IS SLACK GOING INTO THE CONDUIT ENTRANCE.

7. LUBRICANT SHALL BE APPLIED TO THE CONDUIT BEFORE THE CABLE ENTERS THE CONDUIT. IT MAY BE POURED IN OR A PLASTIC BAG OF LUBRICANT MAY BE ATTACHED TO THE PULLING LINE AHEAD OF THE CABLE.

8. ALL CABLE ENDS SHALL BE SEALED TO PREVENT THE ENTRY OF MOISTURE OR DIRT.

9. FOR 1000 MCM CABLE, THE PULLING LINE SHALL BE 2500 LB, SEQUENTIALLY–NUMBERED, CONTINUOUS MULE TAPE.

10. CABLE ATTACHMENT MAY BE WITH KELLEMS (CABLE OR BASKET)✲GRIP OR CONDUCTOR (PULLING EYE)✲GRIP WHICHEVER THE PULLING TENSION CALCULATION DICTATES.

11. ALL CONDUIT ENTRANCES AND EXITS SHALL HAVE PROTECTIVE BUSHINGS IN PLACE THAT WILL ASSURE THAT CABLE DAMAGE DOES NOT OCCUR DURING THE PULL. AT RISER LOCATIONS, DO NOT GLUE PROTECTIVE BUSHING TO CONDUIT.

12. CABLE PULLING SPEED SHALL NOT EXCEED 50 FEET PER MINUTE.

13. ALL CABLE ENDS SHALL BE EITHER TERMINATED OR SEALED IMMEDIATELY AFTER THE PULL. NO CABLE ENDS SHALL BE LEFT EXPOSED OVER NIGHT OR DURING INCLEMENT WEATHER.

REV 1 – CORRECTIONS MARKED WITH A ✲.

14. IT SHALL BE THE RESPONSIBILITY OF THE DESIGNER TO AVOID UNFAVORABLE SIDEWALL PRESSURES. THE SIDEWALL PRESSURES SHALL BE CALCULATED USING THE FOLLOWING EQUATIONS:

(A.) THE SIDEWALL PRESSURE (P) IN GENERAL IS DEFINED AS THE TENSION OUT OF A BEND EXPRESSED IN POUNDS DIVIDED BY THE INSIDE RADIUS OF THE BEND EXPRESSED IN FEET. EQUATIONS 1A AND 1B ARE FOR THE "WORST CASE" CABLE.

EQ 1: $P = \frac{T_o}{r}$ (ONE SINGLE CABLE)

1A: $P = \frac{(3c - 2)}{3}\frac{T_o}{r}$ (TWO OR THREE SINGLE CABLES – CRADLE CONFIGURATION) WHERE $c = 1 + \frac{4}{3}\left(\frac{d}{D - d}\right)^2$

1B: $P = \frac{c\,T_o}{2r}$ (TRIANGULAR CONFIGURATION) WHERE $c = \frac{1}{\sqrt{1 - \left(\frac{d}{D - d}\right)^2}}$

P = SIDEWALL PRESSURE, LBS PER FOOT OF RADIUS
T_o = TENSION (LEAVING THE BEND), POUNDS
c = WEIGHT CORRECTION FACTOR (EQ. 7 AND 8)
r = INSIDE RADIUS OF CONDUIT IN FEET
d = CABLE O.D. IN INCHES
D = CONDUIT I.D. IN INCHES

THE MAXIMUM SIDEWALL PRESSURE SHALL NOT EXCEED 500 LB/FT FOR 1 CABLE OR 1000 LB/FT FOR 2 OR 3 CABLES.

TABLE 1
CABLE PULLING LINE TENSION LIMITS

CABLE	KELLEMS (BASKET) GRIP TENSION (POUNDS)	CONDUCTOR (PULLING EYE) GRIP TENSION (POUNDS)
1 – 1/0 PRIMARY	845 ✲	845
2 – 1/0 PRIMARY	845 ✲	845 ✲
3 – 1/0 PRIMARY	1690 ✲	1690
1 – 1000 MCM PRIMARY	1000	5000 ✲
2 – 1000 MCM PRIMARY	1000 ✲	5000 ✲
3 – 1000 MCM PRIMARY	2000	5000 ✲
4/0 – 4/0 – 2/0 SEC.	3000 ✲	4450
350 – 350 – 4/0 SEC.	3000 ✲	5000 ✲

KELLEMS GRIP IS OVER THE CABLE JACKET. ALSO CALLED "CABLE GRIP" OR "BASKET GRIP."✲
NOTE: 5000 LB LIMIT DUE TO EQUIPMENT LIMITS.

REV 1: CORRECTIONS MARKED WITH A ✲.