



Electronics

The Rochester  
Corporation

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February 19, 2002

*The following is provided to reflect our capabilities as a manufacturer of reliable, high quality cables for use in all types of applications. Although our company dates back to the late 1700's, we have been manufacturing electrical cable since the 1960's and electro-optical products since the early 1980's. Our products have been used to provide power and data transmission tethering balloons to 15,000 feet and to remotely operated vehicles at depths exceeding 22,000 feet. The comments provided below are in response to questions surrounding our capabilities as a cable manufacturer.*

1) *Standard QA Plan for Torque Balanced Underwater Cable*

*The Rochester Corporation has operated under the ISO-9001 quality system since 1993. Prior standards include MIL-I-45208 and MIL-Q-9858A, common quality standards used for military programs. Since each cable is different in design, our quality plans are adjusted accordingly. Typical plans would include the following tests:*

- a) *HVW (High voltage withstand)*
- b) *Leakage Current*
- c) *Insulation Resistance*
- d) *dc Resistance*
- e) *Optical Attenuation*
- f) *Optical Point Defects*
- g) *Breaking Strength (1<sup>st</sup> article or as req.)*
- h) *Torque/Rotation/Elongation (1<sup>st</sup> article or as req.)*
- i) *Other testing as required by design (misc.)*
  - 1) *Electrical attenuation (as req.)*
  - 2) *Impedance (as req.)*
  - 3) *Capacitance as req.)*
  - 4) *Physical/Geometric (as req.)*
  - 5) *Cyclic bending (1<sup>st</sup> article or as req.)*

*When required, test reports with final results are provided along with a Certificate of Conformity. All processes are controlled and documented with Manufacturing Procedures and/or guidelines. These instructions following an Engineering Specification whereby manufacturing is provided a detailed description of the cable along with construction specific information, materials, and tests. All aspects of construction are detailed to assure consistent repeatable manufacture from lot to lot.*

- 2) *Materials To Show Design Capability of the Engineering Group*  
*The average tenure for an Engineer is 17+ years of experience in multiple design disciplines. These disciplines include applications for underwater tow, umbilical cables for ROV control and data acquisition, lead-ins for seismic arrays, submarine telecommunication products for data transmission, range cables for tactical monitoring, MUX cables for oil and gas service, tethers for aerostats, and others. Design standards consist of field proven methodologies and practices, which originate from test-book physics and practical (past) experience.*
  
- 3) *Lists of Tests and Test Equipment Used for Cable Verification*  
*All new cable designs are based on proven materials and construction techniques. Normal testing would include those tests listed in item #1 above. The Rochester Corporation is equipped with the necessary test facilities and equipment to perform the majority of cable-related tests. Besides the standard test equipment (resistance, IR, capacitance, HVW, attenuation (electrical and optical), other equipment (not all) would include:*
  - a) *Water tank for full immersion (15'X15'X15'), temperature regulated*
  - b) *Various tensile fixtures up to 600,000 lbf pull.*
  - c) *Non-contact laser gauges*
  - d) *Network and impedance analyzers*
  - e) *Spectral attenuation test set*
  - f) *Cyclic bend tester*
  - g) *Torque/Rotation/Elongation Bench*
  
- 4) *Duration and Volume of Experience with "Embedded or Locked Armor"*  
*It is our assumption that embedded or locked armor is that, which has been encased within the final outer plastic jacket. The Rochester Corporation has provided numerous designs over the years incorporating this approach. Depending on application and suitability, this option is available.*
  
- 5) *Duration and Volume of Experience with "Water Blocked" Cables*  
*As with item #4 above, we have provided numerous designs over the years incorporating blocked cables. It must be recognized that the term "water block" and void-filled are considered synonymous. Most all cable we provide is void-filled to restrict the intrusion of water and to provide for a more stable package. Since many cable are considered "working" or are dynamic in operation, the stability afforded by the void-filler promotes improved flexure and reduced elongation. We have been void-filling cable since the 1960's for use down-hole in oil and gas exploration.*
  
- 6) *Limiting Factor for Existing Production Equipment*  
*Due to the diversity of markets we supply, we are equipped with a variety of equipment to fulfill the most challenging design. Since the limiting factor is based on design, it is difficult to address our limitations. For a better understanding of our capability, the following is presented:*
  - a) *Extrusion – Various lines; 24:1 type; from 1.0" to 3.5"*  
*PE, EPC, Polyesters, Nylons, PVC, PU, ETFE, FEP, PFA, EPDM*

- b) *Cabling – Various lines, twinners/quadders, 72 – 25" bobbin; 22 – 54" bobbin; other smaller lines.*
  - c) *Armoring – Various lines, tubular and planetary; 72 – 25" bobbin (36x36) largest line capable of accepting up to 4" diameter cores.*
  - d) *Take up capacities – Various lines, largest being 130"X102" overall width reel; rail siding permits off loading directly unto rail car; smaller facilities available.*
- 7) *Range of Delivery Times, Typical and Extraordinary*  
*Typical delivery times range from 12 to 14 weeks after receipt of order depending on factory loading. Maximum delivery not expected to go beyond 18 weeks. Depending on arrangements, times may be as short as 6 to 8 weeks.*
- 8) *Unique Part Number and Control of Revisions for Each Cable*  
*All designs are assigned a unique number along with a revision level. The customer may elect to specify the revision level in the purchase order to assure product consistency. An Engineering Change Proposal (ECP) is submitted to the customer if a modification or revision to the design is deemed necessary. Only upon customer approval is such a change implemented. This procedure provides the customer full control of the document.*
- 9) *Cable Stocking Program*  
*The Rochester Corporation has entered into stocking programs in the past. The arrangement for such a program will need to be identified and discussed.*