

Creating an effective waterproof seal design for Quick-Lock Connectors QMA & QN is an important task. In this short article we examine the issue of sealing by analyzing two respective connector designs currently on the market in contrast to our own innovative design concept.

- **Design and Analysis of Current Models**

1) The seal design principle for SMA and N type connectors is dependent on the threaded connection between the male and female. As the plug is screwed into the jack, the front end of the outer conductor creates displacement in the seal washer by gradually pressing tighter against it thereby achieving an effective seal. Among RF connectors, this classic design manages to produce excellent results, completely satisfying IP68 standards while at the same time maintaining a relatively long life-span. See figure 1

2) QLF's QMA and QN (see figure 2). The seal design for QN involves placing an O-ring in a groove of the inner wall of the male's outer conductor. When the plug is inserted into the jack the O-ring comes into contact with beveled end of the female which creates pressure and changes the shape of the O-ring, resulting in a seal effect. However, the change in the O-ring is fairly limited, and after continuous mating and de-mating the repeated contact between the O-ring and the female's beveled end and outer cylindrical surface will result in abrasion of the O-ring, negatively influencing its performance. As to the QLF's QMA seal design, we still have not had a chance to review a sample and so have no way to evaluate its performance.

- **Our Design Concept**

We believe a quality seal design needs to not only guarantee a solid sealing effect but also reduce abrasion to the sealing components as much as is possible so as to increase their lifespan. We based our QMA, Mini-QMA and HPQN design on these principles.

As mentioned above, the SMA and N connectors' seal design produces fine results, but it would prove exceedingly difficult to apply these principles to our own design. We needed to create a completely new seal design that would fit a QUICK-LOCK connector.

From the beveled edge in the QMA and QN female we got an idea. We also placed an O-ring seal in a groove of the inner wall of the male's outer conductor, but moved it slightly toward the front of the connector. Then we decreased the vertical length of the step abutting the O-ring at the front end of the connector in order that a circumferential upslope, or bulge, set on the surface of the female could be inserted and exert pressure on the O-ring. The resulting effect can be seen in figure 3: after connection, in which the beveled edge of the female first comes into contact with the O-ring (this contact is made with only minimal force and causes very little wear on the seal), the circumferential bulge on the surface of the jack presses against the O-ring creating pressure and deforming its shape so that it presses strongly against the three inner walls of the groove where it rests. In this manner a very solid seal is formed that completely satisfies IP68 standards.

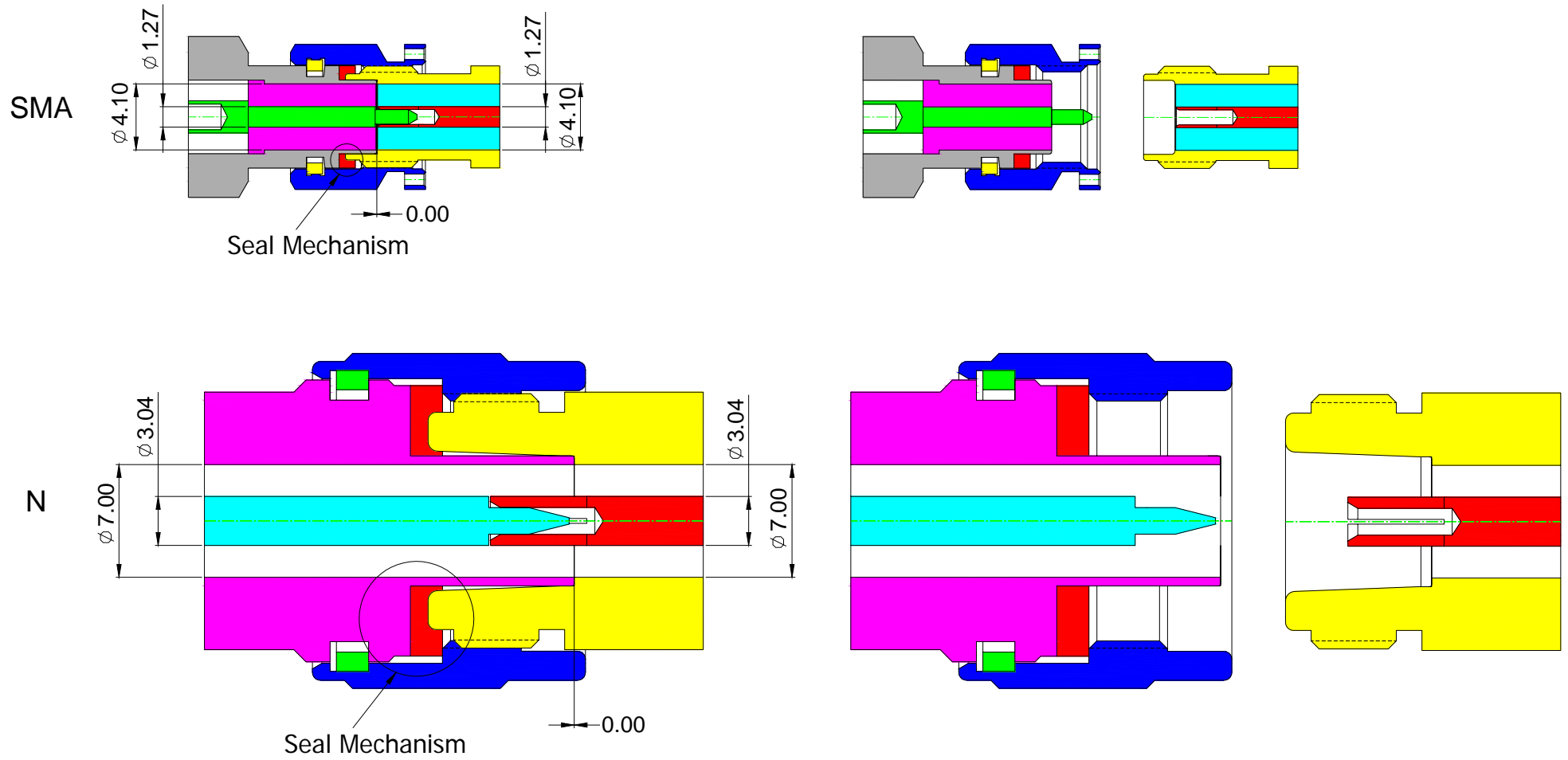
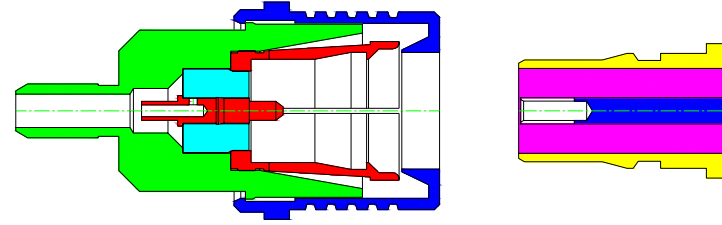
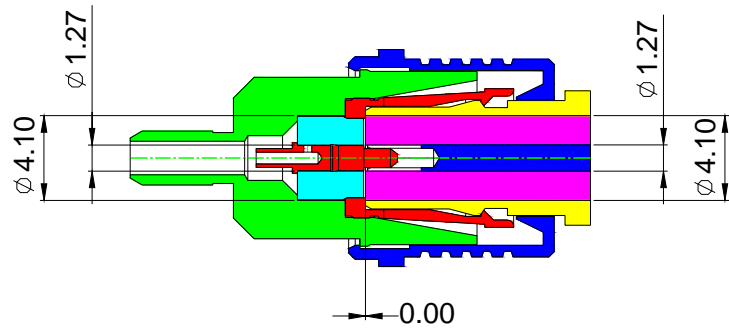


Figure 1

QMA



QN

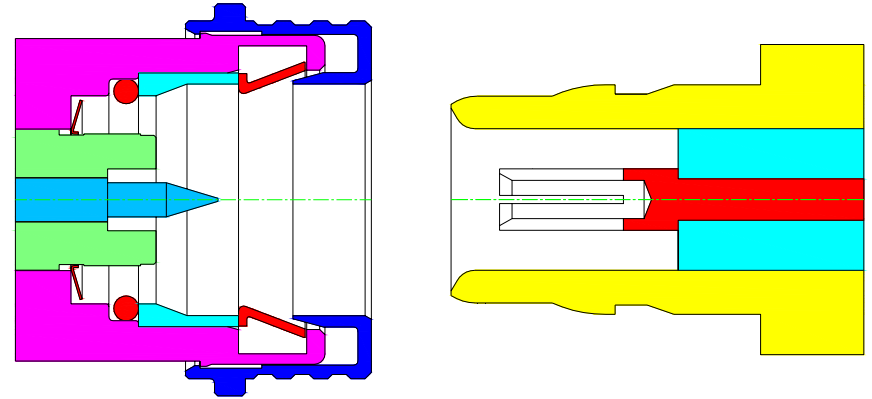
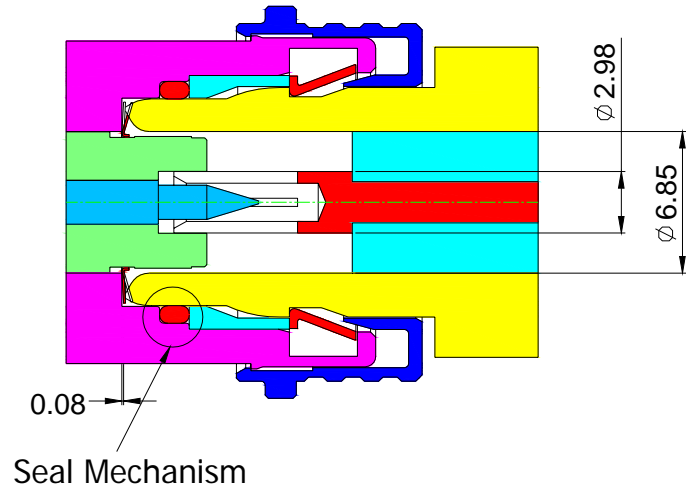


Figure 2

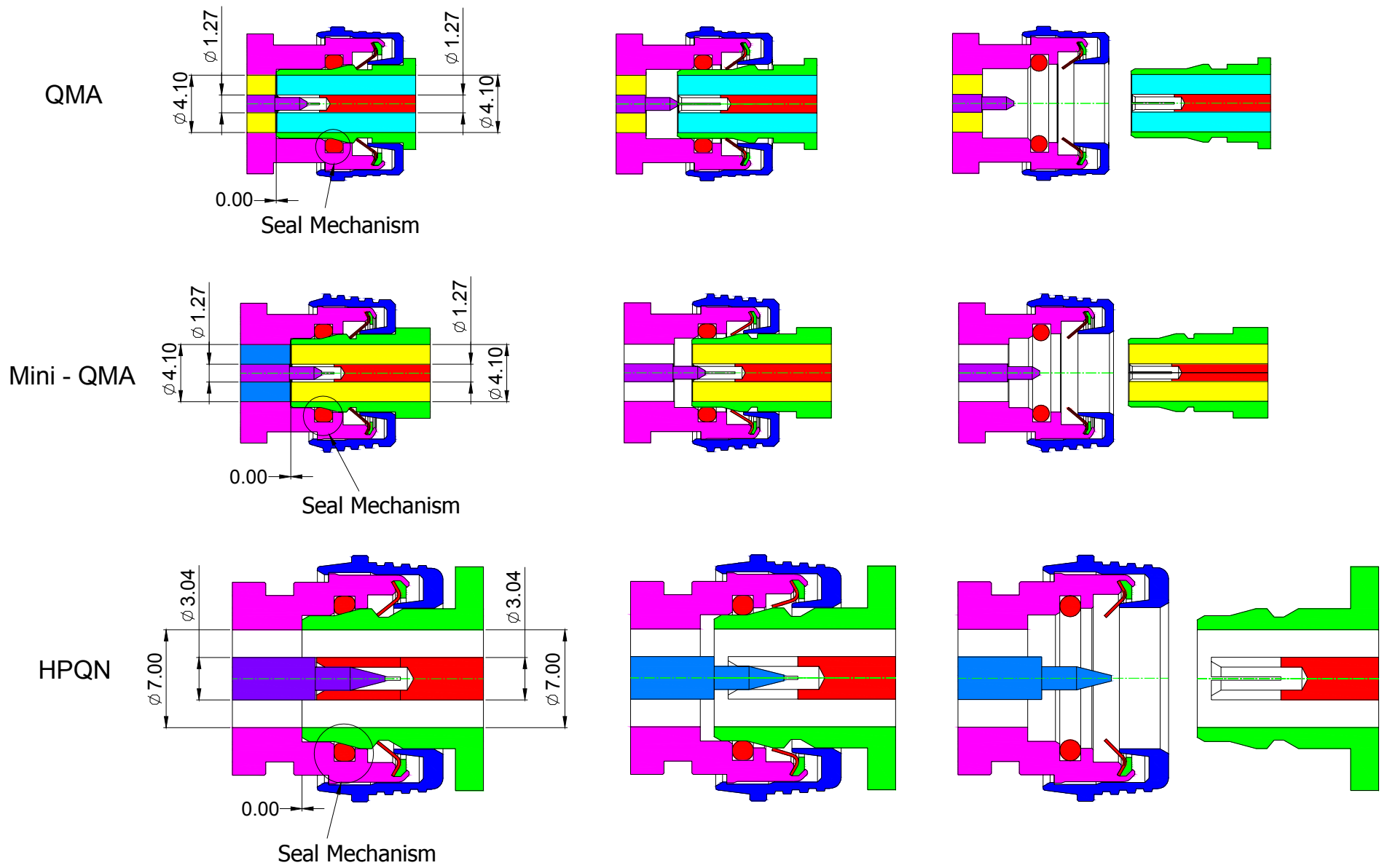


Figure 3