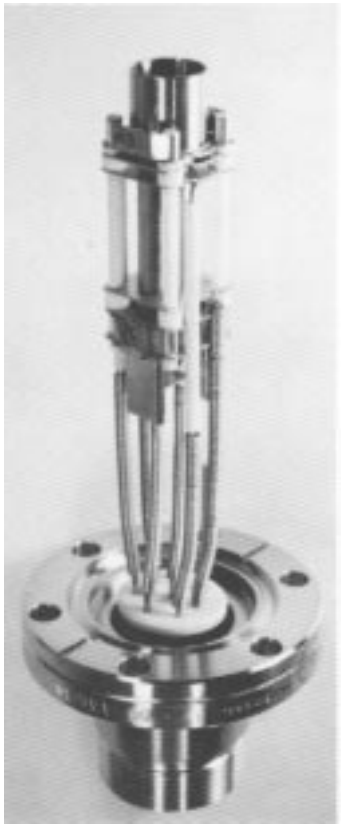
PRECISION PARTS FOR UHV PHYSICS AND HIGH VACUUM TECHNOLOGY

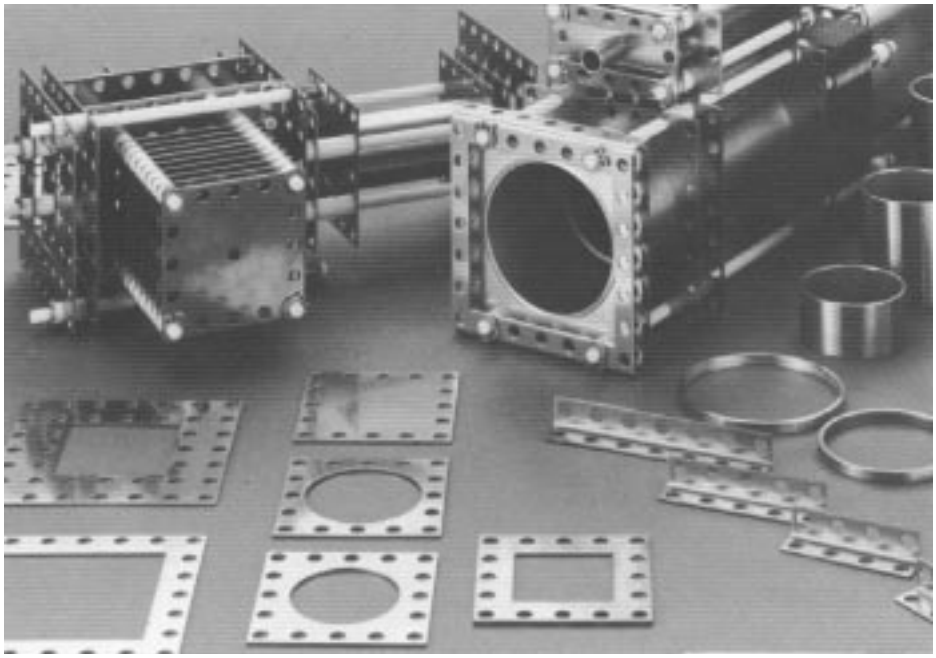
eV Parts are a group of several hundred standard parts used for construction of all types of surface physics and high vacuum apparatus. Made of high temperature metals and high purity insulators, the parts have application in research, teaching, product development and production. They are particularly useful in the eV to keV region, and in experiments involving beams (or fluxes) or charged or neutral particles.

Ion sources, electron guns, evaporators, Knudsen cells, neutral beam sources, ionization chambers, heat shields, acceleration structures, electrostatic lenses, electron multipliers, slit systems, shutters, LEED equipment, target holders, Faraday cages, vacuum fixturing, mass spectrometers, and scanning microscopes have all been built using the parts; other complex structures can be readily assembled.

The available parts include precision plates and cylinders for making electrodes, mounting rods, insulating spacers, brackets, special hardware and numerous other parts and hard-to-get materials.The available parts include precision plates and cylinders for making electrodes, mounting rods, insulating spacers, brackets, special hardware and numerous other parts and hard-to-get materials.

eV Parts are completely compatible with other types of electron gun parts such as those used in the cathode ray tube industry. Consequently eV Parts may be used to modify or add to existing commercial high vacuum apparatus with little effort. Use of these standardized parts provides flexibility in a manner similar to that used in the construction of electronic apparatus from standard resistors, capacitors, switches, etc. The parts have standard dimensions and are manufactured to high tolerances; complex manual skills are not required for their use.





ULTRAHIGH VACUUM MATERIALS

eV Parts are manufactured from the highest quality materials available. Standard electron parts are made of chemically cleaned 304 stainless steel. Other materials such as tantalum or gold plated stainless are available on special order. All insulator parts: rods, spacers, spheres, and tubing, are made of best grade 98/99% pure vitreous alumina. Refractory metal fasteners and springs are provided, hence it is possible to build structures which are completely non-magnetic. Other special materials include knitted-tungsten grid material, tungsten filament wire, tantalum wire for filament mounting, and sheet stock.

ASSEMBLY

The parts are assembled on centerless-ground ceramic rods and secured using any of a variety of fasteners: lock rings, screw clamps, strap nuts, friction wirenuts, and ordinary machine screws. In addition, permanent assemblies can be spot-welded.

The parts are self-aligning by virtue of their mounting holes, and remain locked in place even over extended bakeouts. Tungsten springs allow for differential thermal expansion.

An extensive instruction manual describing construction techniques and showing many typical structures is included with the parts systems. The manual includes a complete parts list with descriptive drawings and specifications for each part. Parts are designated by a catalog number which indicates the material, function, scale factor and dimensions. This designation facilitates parts identification for construction and reordering.

Except for tools furnished, ordinary hand tools and a laboratory spot-welder are all that are required when using eV Parts. However, parts may be usefully cut and bent into new special shapes using micrometer controlled shears and brakes.

PARTS DESIGN

eV Parts are precision manufactured using jig bored tooling and chemical machining, with tolerances of one or two thousandths of an inch in most cases. Ceramic tubing is precision ground using diamond tooling. Thus the parts fit reliably, and accurate alignment of lenses, slits, and apertures is straight-forward. Assemblies are rigid, self-supporting and dimensionally stable. They may be disassembled quickly for modification, salvage, or cleaning; have a low thermal mass; and can easily withstand 500°C bakeouts.

eV Parts are designed for maximum flexibility. Plate parts are provided of many different types, each intended for multipurpose applications. For example, the large round-hole plates may be used either as apertures or as supports for the cylinder parts. The high degree of symmetry in each part results in a very large number of possible configurations.

The parts are manufactured in two size groups which differ by exactly a factor of 2. Identical patterns are available in each size group and special parts are provided to allow size mixing. The larger parts (series C) are intended for rugged structures and are well suited to graduate student use. The smaller parts (series B) are more useful in building complex structures such as miniature electron guns and precision energy analyzers. Over 350 parts types are available and the number increases regularly as new designs prove their utility.

AVAILABILITY AND PACKAGING

eV Parts are available packaged in three ways: as individual part types in Standard Packages, as groups of part types in Assortments, and as balanced sets in Parts Systems.

Standard Packages each contain parts of just one type, and are the normal way of ordering individual types of specific parts. All Standard Packages are priced identically, with manufacturing costs determining the quantity of parts per package. Quantities and price may be determined from the enclosed sheets. Normally parts are shipped from stock within 48 hours.

Assortments are a simple one-line way of ordering groups of Standard Packages comprising most parts of a particular generic type, for example, most Series C insulator parts. Assortments are also normally shipped within 48 hours.

Balanced sets of parts, called Parts Systems, have been designed to meet many common needs. Most users find an efficient way to establish a facility is to start with a Parts System, and then add Standard Packages or Assortments as required. Systems are shipped promptly if in stock, if not, up to three weeks must be allowed.