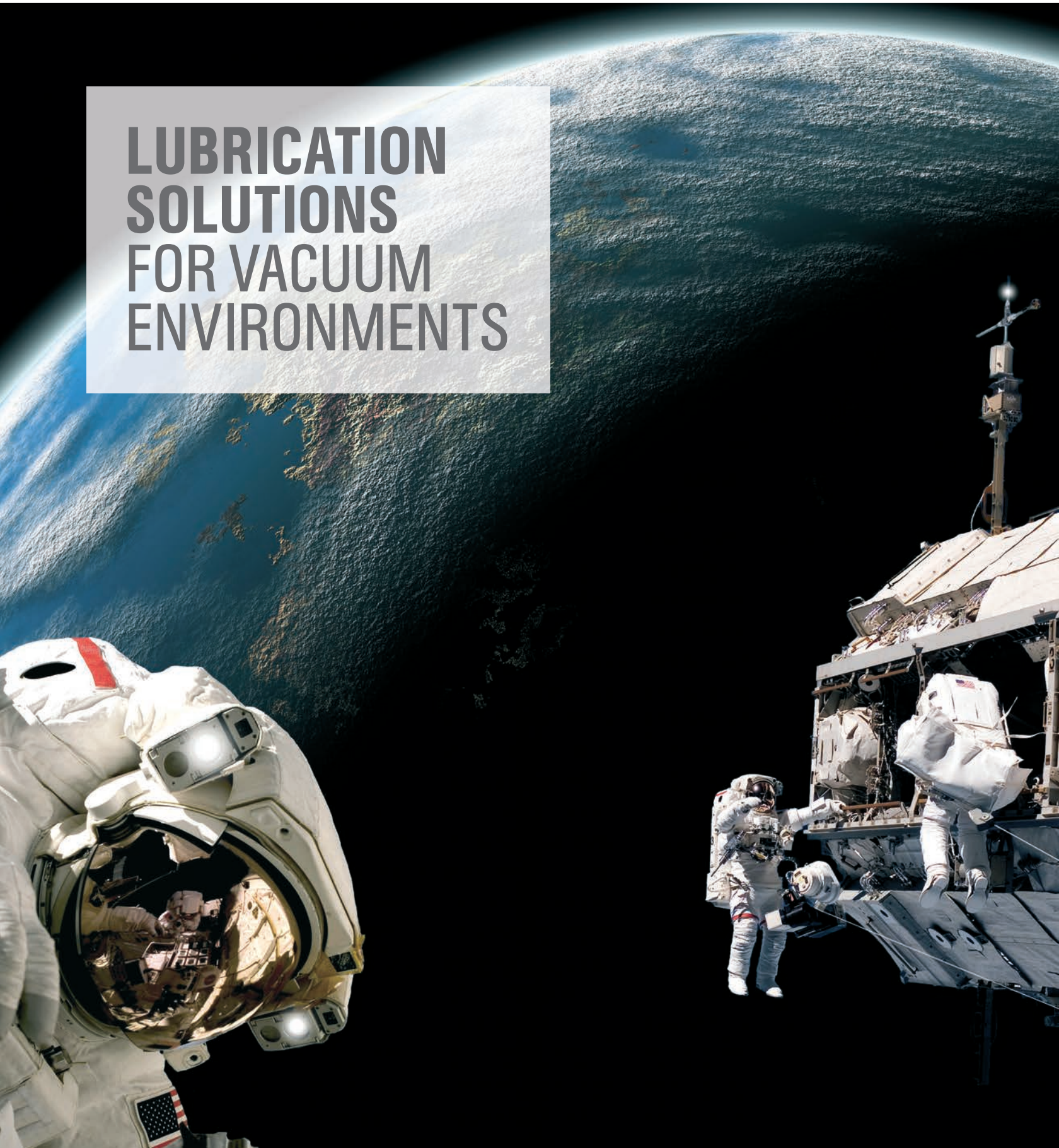


# LUBRICATION SOLUTIONS FOR VACUUM ENVIRONMENTS



IT'S MORE THAN JUST OIL. IT'S LIQUID ENGINEERING.®

 **BRAYCO**

# UNIQUE SOLUTIONS FOR UNIQUE PROBLEMS IN UNIQUE MARKETS

## CASTROL® PERFLUOROPOLYETHER (PFPE) LUBRICANTS HAVE BEEN THE VACUUM ENVIRONMENT LUBRICANTS OF CHOICE FOR OVER 35 YEARS.

Castrol perfluoropolyether lubricants are the lowest outgassing and lowest volatility lubricants available on the market. Castrol **Brayco® 815 Z** oil is the standard for low outgassing, low temperature lubricants. **Brayco 815 Z** combines a pour point below -70°C, ASTM E595 outgassing results of <1.0% Total Mass Loss and <.01% Collectible Volatile Condensable Materials at 125°C and 10-5 torr vacuum. As a stand-alone product or as the base oil in one of our many PFPE greases, **Brayco 815 Z** has been successfully used in many manned and unmanned missions in Earth orbit, as well as missions to the Moon and to Mars.

Castrol began customizing product solutions for semiconductors customers in the mid-1990s by developing the Castrol Microcote (now Castrol Braycote®) line of low outgassing and low volatility lubricants. Like our Castrol Brayco perfluoropolyether lubricants, the Braycote product line has been proven to enhance equipment functions by virtually eliminating lubricant outgassing and greatly reducing the formation of particulates and chemical reactions. Castrol's PFPE lubricants are ideal for vacuum, cleanroom and reactive chemical (e.g. oxygen) environments and applications.

Castrol PFPE lubricants are LOX/GOX compatible, exhibit a strong resistance to most chemicals, acids and bases and are not soluble in jet fuel and rocket propellant applications. Recognizing that a special solvent was required to effectively clean our PFPE lubricants, Castrol developed the Castrol Brayco IC X-100 solvent.

Castrol's research and development capabilities provide the analysis our customers need to determine the best lubrication solutions for critical and non-critical applications. Typical areas of use are the lubrication of ball bearings, roller bearings, linear motion components, key miniature bearings, sinter bearings, lead screws, vacuum pumps, valves, wafer lifts and process chamber shutters, as well as other applications where evaporative weight loss at high temperature, vapor pressure and/or low temperature performance are critical.



## CASTROL SPECIALTY OILS

PRODUCT	KINEMATIC VISCOSITY , cST			EVAPORATION WT LOSS % 72 hrs @ 232°C (450°F)	VAPOR PRESSURE	
	100°C	40°C	-40°C		@20°C	@100°C
Castrol® Brayco® 815Z	45 (99°C)	148 (38°)	6,500	0.36	4x10 <sup>-13</sup>	2x10 <sup>-9</sup>

## CASTROL SPECIALTY GREASES

PRODUCT	NLGI GRADE	TEMPERATURE RANGE	EVAPORATION WT LOSS % / 22 HRS, 204°C	BASE OIL VAPOR PRESSURE	
				@20°C	@100°C
Castrol® Braycote® 600 EF	2	-80°C to 204°C (-112°F to 400°F)	0.26	4x10 <sup>-13</sup>	2x10 <sup>-9</sup>
Castrol® Braycote® 601 EF	2	-80°C to 204°C (-112°F to 400°F)	0.87	4x10 <sup>-13</sup>	2x10 <sup>-9</sup>
Castrol® Braycote® 602 EF	2	-80°C to 204°C (-112°F to 400°F)	0.22	4x10 <sup>-13</sup>	2x10 <sup>-9</sup>
Castrol® Braycote® Micronic 700	2	-80°C to 204°C (-112°F to 400°F)	0.14	4x10 <sup>-13</sup>	2x10 <sup>-9</sup>
Castrol® Braycote® Micronic 1613	2	-72°C to 204°C (-100°F to 400°F)	0.18	4x10 <sup>-13</sup>	2x10 <sup>-9</sup>
Castrol® Microcote® 296	2	-50°C to 204°C (-58°F to 400°F)	0.14	5x10 <sup>-13</sup> for whole grease (extrapolated)	3.5x10 <sup>-10</sup> for whole grease (extrapolated)

## CASTROL SPECIALTY MILITARY SPECIFICATION GREASES

PRODUCT	NLGI GRADE 22 HRS, 204°C	TEMPERATURE RANGE	EVAPORATION WT LOSS % / 22 HRS, 204°C	MILITARY SPECIFICATION CERTIFICATION
Castrol® Braycote® 804	1	-54°C to 149°C (-65°F to 300°F)	10.0 @ 149°C	MIL-PRF-27617F, Type 1
Castrol® Braycote® 806*	2	-30°C to above 204°C (-22°F to above 400°F)	1.60	MIL-PRF-27617F, Type III

\* available with Corrosion Inhibitor

## CASTROL SPECIALTY CLEANERS AND SOLVENTS

PRODUCT	DESCRIPTION
Brayco® IC X-100	Designed for use in grease plating perfluorinated lubricants and other halogenated lubricants. Compatible with most metals, plastics and elastomers.

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## HEALTH, SAFETY AND ENVIRONMENT

At Castrol, we make sure that all our employees, contractors and distributors are well informed, well trained, engaged and committed to the HSE improvement process. We recognize that safe operations depend on competent people and an active HSE culture.

Castrol fully participates in hazard identification and risk assessments, assurance audits and reporting of HSE results. We also help others to share in our understanding of this important subject. Castrol is uniquely capable of providing a wide range of services from training and technical advice to setting up standards for customer HSE policy and practices.

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