# TECHNICAL INFORMATION & SPECIFICATIONS

SOLAR FLUX, INSTEAD OF PURGING, FOR X-RAY QUALITY WELDS IN STAINLESS STEEL AND NIGH-NICKEL ALLOYS

For fusion welds… for every type of joint… by all welding methods… faster, better, lower-cost welds for over 70 years.

## PHYSICAL AND CHEMICAL PROPERTIES

Solar Flux, in its powder state before mixing with alcohol (methanol preferred), has a virtually infinite shelf life. In its powdered state Solar Flux is unaffected by freezing, has no flashpoint, is non-flammable and non-explosive, and completely safe for transportation by air. A little flux goes a long way. 2 oz. of flux, properly mixed and applied, covers about 80 lineal feet of joint. Use Type B on stainless steel and high chromium alloys. Use Type I on high-nickel (over 25%) alloys.

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|---|---|
| Form | Fine Powder, Odorless |
| Color | Type B - Dark Gray<br>Type I - White |
| Specific Gravity | 2.2 |
| Volatile Content, Flashpoint, Explosion Limit | None |
| Freezing Effects & Melting Point | None |
| Welding Temperature Range | 2000 -2900 F |
| Silica and Fluorides | Yes |
| Halogens, chlorides, or low melting point materials | None |
| Boiling point, 760 mm Hg | 3060 F |
| Vapor Density & Vapor Pressure | None |
| Solubility in water, % by weight | 4.2 gm/ml |
| Evaporation Rate, Flammable Limits | None |
| Auto Ignition | None |
| Unusual Fire or Explosion Hazard & Auto Ignition | None |
| Special Fire Fighting Procedures | None |
| Extinguishing Media | Any, water ok |
| Mixing Media | Alcohol – methanol preferred |
| Mixing Amount | 6-7 oz. methanol to 1 lb. powder |
| Use with consumable backup rings | OK |
| Effect on Radiography | None |

Safety Precautions: Avoid breathing powder. Weld in well-ventilated areas. Personal protection, standard for welding. For more detail see Safety Data Sheets. Solar Flux conforms to U.S. Military Specification MIL-F-7516B, as follows: Type B, classes 2 & 4; Type I, classes 1, 2, 3, & 4. All batches of Solar Flux are compounded, manufactured, inspected, tested, and packaged in accordance with our original formulae and patents, in conformance with accepted procedures and quality control requirements.

## APPLICATION CHART

For the 18-8 Stainless Steels, e.g. AISI Nos. 301, 302, 302B, 304, 304L, 305, 308, 316, 316L, 317, 317L, 321, 347, 348 – Use Type B.

For other Stainless Steels, e.g. AISI Nos. 201, 202, 309, 309S, 310, 310S, 314, 403, 405, 409, 410, 412, 414, 416, 420, 430, 431, 442, 446, 501, 502, 505 – Use Type B.

For Precipitation Hardening Stainless Steels, Chrome-Moly Steels, and all other alloys not mentioned above which contain less than 25% nickel – Use Type B.

For High Nickel Alloys (containing over 25% nickel, e.g. Monel, Inconel, etc.) – Use Type I, which is specifically compounded for welding the nickel-rich alloys.

## DIRECTIONS FOR USE

(1) Remove grease. Solar Flux will remove the dirt and oxides, but grease should be removed first with a solvent.

(2) Mix. In a separate container mix a small amount of Solar Flux powder with pure methanol (methyl alcohol) to the consistency of thick cream. Recap flux can tightly. (a) Methanol is often sold in auto parts/accessory stores and departments as a "gas-line anti-freeze/demoisturizer." Use only brands that are 100% Methanol and which contain no other chemicals, as these other chemicals may prevent the flux from working properly. (b) While other forms of alcohol, e.g. "isopropyl", "rubbing alcohol", "ethyl alcohol", etc. may be used, methanol provides best results.

(3) Permit mixture to stand for a few minutes while chemical reaction takes place. Add methanol to maintain consistency if mixture thickens during work. Do not remix flux mixture which has completely dried out.

(4) Apply mixture to joint before tacking. A light coat between the edges of the joint will prevent the formulation and inclusion of oxides produced by the tack weld. Apply with a flux brush or acid brush. Allow a few minutes for the methanol to evaporate.

(5) Apply flux to back side of joint, and where possible, to both sides. Let methanol evaporate and commence tacking and/or welding. If two passes are required, the cap pass can be made without additional fluxing required. Flux remaining from the root pass will protect the weld without causing contamination.

(6) Welds easily. Solar Flux will prevent oxidation of the underside, eliminate oxide contamination of the weld and support the molten weld metal. Use no purging gas, backup tape, or backup bar. Suspend or support work so that the flux is not in contact with the table.

## CLEANING

A thin, chemically-inert, glass-like residue adheres to the base metal after welding. While unattractive, this residue does not affect the quality of the weld and usually is not removed. Depending on access to the inside of the weld joint and degree of cleanliness required after welding, a stainless wheel, stainless wire brush, or chemical cleaner (e.g. Wonder Gel, available from Bradford Derustit.) will remove the residue. If cleaning with nitric and/or hydrofluoric acid is desired, please contact Golden Empire Corporation for more complete information.

Some pipe or tube welding applications require absolute purity and a polished inside surface. These include food or beverage lines where subsequent product refining will not take place, medical oxygen lines, computer chip manufacturing air lines, and steam lines operating above 1,000 F. In these situations, we recommend gas purging instead of Solar Flux to avoid nitric acid/hydrofluoric acid cleaning.

## SOLAR FLUX IS MANUFACTURED EXCLUSIVELY BY:

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