

Lead Free Soldering

Market Application Publication



Background:

Spurred by environmental concerns, the wave soldering industry is converting to lead free solder. The new solder paste, now tin-based, requires the soldering process to operate at higher temperatures, 220°C from 183°C. Soldering at higher temperatures breaks down the organic solderability coating on boards, causing oxidation, cross buildup, and other aesthetic flaws such as pitting or voids.



Contact Information: Features and benefits:

Parker Hannifin Corporation
Filtration and Separation Division
242 Neck Road
Haverhill, MA 01835

phone 800 343 4048 or 978 858 0505
fax 978 478 2501

www.parker.com/balston

- Improves solder quality by eliminating oxidation in the soldering process
- Improve soldering aesthetics by reducing pitting or voids
- Promotes corporate responsibility and EPA compliance as an environmentally safe manufacturing process
- Significantly reduces operating costs and maintenance expenditures
- Maintains consistent part quality and eliminates product defects
- Eliminates the need for potentially hazardous cylinders or dewars resulting in increased workplace safety
- Compact design frees up valuable floor space



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Application:

Nitrogen inerting is being used widely in lead-free solder applications. The elimination of oxygen prevents oxidation which is the major cause of degradation in the organic solderability coating on circuit boards. Inerting with Nitrogen will improve joint integrity by reducing pitting, voids and discoloration in the solder. Nitrogen will also improve machine performance and reduce solder dross build up.

Balston Nitrogen Generation Systems deliver clean, dry, pure nitrogen to lead-free solder applications. The installation of a nitrogen generator in place of bulk nitrogen or cylinder supply will significantly decrease operating costs and maintenance costs while ensuring defect free production runs.

Case Study:

Lead increases the solder's "wetting-action", allowing solder to melt at a set temperature, while giving solder joints an appealing, shiny, smooth finish. The move to eliminate lead from circuit board assemblies makes the wave-soldering process more difficult. Without lead, solder alloys become sluggish when molten and "wetting-action" decreases dramatically. Higher operating temperatures are required to melt the new lead-free alloys. These alloys may also produce dull, grainy, unattractive solder joints.

Customers experiencing these problems turn to Parker Balston for a solution. DCA Manufacturing, an assembly sub-contractor out of Cumberland, Wisconsin, is currently using a Parker

Balston Nitrogen Generator to satisfy their nitrogen needs. After replacing their dewar supply with a Parker Balston DB-5 generator, DCA noticed considerable improvements in solder aesthetics, plant safety and convenience, along with significant decreases in maintenance and operation costs.



Principal Specifications

Model Number	DB-5, DB-10	DB-15, DB-20
Nominal Conditions		
Feed Pressure (minimum)	110 psig	110 psig
Temperature	80°F	80°F
Ambient Pressure	1 Atm.	1 Atm.
Compressed Air Specifications		
Maximum Pressure	140 PSIG	140 PSIG
Temperature Range	60°F - 105°F	60°F - 105°F
Dewpoint	40°F atmospheric dewpoint or better	40°F atmospheric dewpoint or better
Residual Oil Content	Trace	Trace
Particles	<.01 micron	<.01 micron
Ambient Conditions		
Temperature	45°F - 95°F	45°F - 95°F
Ambient Pressure	Atmospheric	Atmospheric
Air Quality	Clean air without contaminants	Clean air without contaminants
Dimensions, Weight and Connections		
Dimensions	28.5"L x 32.25"D x 78"H	28.5"L x 50"D x 78"H
Weight	620 lbs (DB-5), 830 lbs (DB-10)	1240 lbs (DB-15), 1450 lbs (DB-20)
Inlet/Outlet	1/2" NPT/1/2" NPT	1" NPT/3/4" NPT

Performance Data

Nitrogen Flow SCFH (Nm³/hr), for Models DB-5 to DB-80

% Nitrogen (1)	DB-5	DB-10	DB-15	DB-20
99.999	94 (2.6)	189 (5.4)	283 (8.0)	377 (10.7)
99.995	150(4.2)	300 (8.5)	450 (12.7)	600 (17.0)
99.99	194 (5.5)	388 (11.0)	583 (16.5)	777 (22.0)
99.95	314 (11.7)	629 (17.8)	943 (26.7)	1258 (35.6)
99.9	365 (10.3)	730 (20.7)	1095 (31.0)	1460 (41.3)
99.5	512 (14.5)	1024 (29.0)	1536 (43.5)	2048 (58.0)
99	618 (17.5)	1235 (35.0)	1853 (52.5)	2470 (70.0)
98	770 (21.8)	1541 (43.6)	2311 (65.4)	3081 (87.2)
97	892 (25.3)	1783 (50.5)	2675 (75.75)	3566 (101.0)
96	983 (27.8)	1966 (55.7)	2949 (83.5)	3931 (111.3)
95	1065 (30.2)	2130 (60.3)	3195 (90.5)	4260 (120.6)

Notes

1 Stand-by feature is unavailable for purities 99.995-99.999%

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