DCI, Inc.
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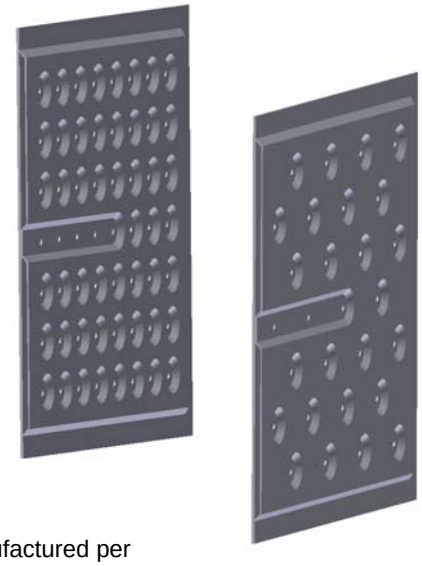
Heat Transfer Surface Designs
Technical Data Sheet

X-7258-0

• Plug Welded Dimple Jackets

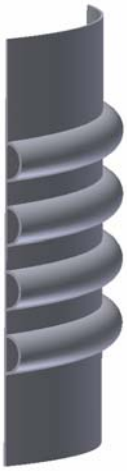


- o Dimpled and hole punched in the flat, rolled, shaped and plug welded to the vessel. Manufactured per ASME Section VIII, Division 1, Appendix 17, 17-1(a)(1) and 17-1(b)(3).
- o Pre-formed design provides better long term performance compared to "inflated" jackets such as autogenously (no filler wire) welded laser or resistance welded designs
- o Available in 16 gauge (standard) or 14 gauge thicknesses
- o Maximum heat transfer (U coefficient) by turbulence and high velocity flows
- o Maximum efficiency by use of formed baffling to direct flow
- o Multiple patterns available such as 2.25" x 2.25" (AF-standard), 4.5" x 4.5" (WG-low pressure), and 2" x 2" (HP-high pressure)
- o Thermal-Shock resistant designs available
- o Single or Multi-Zones of many sizes available
- o Most common and very cost effective on storage tanks and pressure vessels

• Laser Welded Dimple Jackets (Inflated)

- o Laser welded in the flat, tank is formed, then jacket is inflated. Manufactured per ASME Appendix 17, 17-1(a)(2) and 17-1(b)(4)(5).
- o Available in 18 gauge or 20 gauge (standard) thicknesses (based on vessel wall thickness)
- o Similar heat transfer by turbulence and high velocity flows as plug welded jackets
- o Higher pressure drops and lower flows than dimple jackets
- o Multiple patterns available, size of zones have limitations, more external piping may be required
- o Most cost effective on small area requirements and tanks with walls manufactured from 12 ga. thru 7 ga
- o Double Embossed panels available for special applications
- o Economical alternative for low pressure, low flow, and non-thermal shock applications

• Half-Pipe Jackets

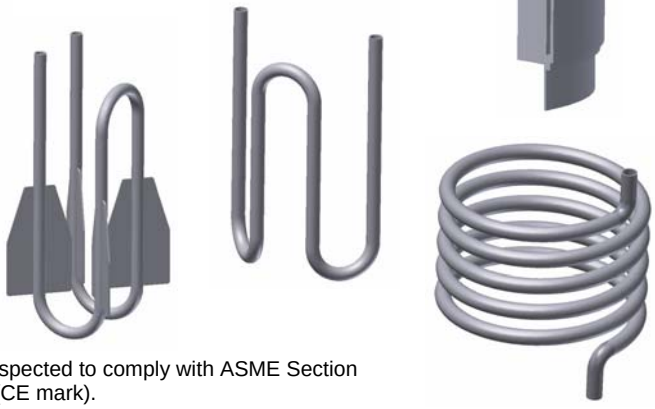


- o "Half-Pipe" welded directly to vessel wall. Manufactured per ASME Section VIII, Division 1, Appendix EE.
- o High flow rates with low pressure drops
- o Multiple pipe sizes available (2", 3" & 4")
- o Available in 10 gauge to 7 gauge thicknesses as material is formed for vessel shells
- o Spiral wrapped on bottom heads using actual pipe
- o Thermal-Shock resistant designs available
- o Very expensive design to manufacture

• Conventional Jackets

- o Manufactured per ASME Section VIII, Division 1, Appendix 9.
- o Typically used on smaller vessels with low pressures
- o Normally thicker materials required due to design
- o Normally the most expensive option

• Vessel Internal Coils



- o Manufactured per ASME Section VIII, Division 1.
- o Normally used as an additional heat transfer surface for maximum heat transfer in addition to a vessel jacket
- o Available in spiral, u-bend, and custom designs in many sizes

All heat transfer surface designs can be designed, manufactured, tested, and inspected to comply with ASME Section VIII, Division 1 ("U" stamp) and PED (Pressure Equipment Directive 97/23/EC) (CE mark).

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Materials of Construction

- All DCI Heat Transfer Surfaces are available in a variety of materials of construction to accommodate different corrosion, fatigue, and thermal shock environments. Common materials available are:
  - **304** (S30400; EN 1.4301), **304L** (S30403; EN 1.4307), **316/316L** (S31600/S31603; EN 1.4404)
  - **Duplex LDX 2101®**, (S32101; EN1.4162) and **Duplex 2205** (S31802/S32205; EN 1.4462)
  - **Inconel® 625** (N06625; EN 2.4856) & **Inconel® 600** (N06600; EN 2.4816)
  - Others materials available upon request
- DCI recommendations:
  - DCI recommends using alloy Duplex LDX 2101® for moderate thermal shock applications or Inconel® 625 for extreme thermal shock applications of plug-welded dimple jackets or half-pipe jackets (Reference DCI document # X-7141).
  - DCI recommends using Duplex LDX 2101® or higher alloys for best resistance against chloride stress corrosion cracking (SCC), the most common failure seen in 304, 304L, and 316/316L heat transfer jackets.
  - DCI does not recommend using Duplex SS, Inconel® 600 or Inconel® 625 for any 'inflated' type jackets [ASME 17-1(a)(2)] whether they are laser welded, resistance welded or welded with any other process autogenously (no filler wire).
  - DCI recommends using Inconel® 625 over Inconel® 600 for most heat transfer applications due to the lack of chrome and molybdenum (see table 1) in Inconel® 600.

Table 1 Alloy Chemistry Chart (ASTM A240-06b, B168-01, B443-00e1)

Alloy (UNS#)	C(max.)	Cr	Ni	Mo	Fe	N	Mn	Other
304/304L (S30400/30403)	0.08/0.030	18.0-20.0	8.0-10.5/12.0	-	Balance	0.10 max.	2.00 max.	P,S,Si
316/316L (S31600/31603)	0.08/0.030	16.0-18.0	10.0-14.0	2.00-3.00	Balance	0.10 max.	2.00 max.	P,S,Si
Duplex LDX 2101® (S32101)	0.040	21.0-22.0	1.35-1.70	0.10-0.80	Balance	0.20-0.25	4.0-6.0	P,S,Si,Cu
Duplex 2205 (S31803/S32205)	0.030	22.0-23.0	4.5-6.5	3.0-3.5	Balance	0.14-0.20	2.00 max.	P,S,Si
Inconel® 600 (N06600)	0.15	14.0-17.0	72.0 min.	-	6.0-10.0	-	1.0 max.	S,Si,Cu
Inconel® 625 (N06625)	0.10	20.0-23.0	58.0 min.	8.00-10.00	5.0 max.	-	0.50 max.	P,S,Si,Cu,Al,Nb,Ti,Co

LDX 2101® is an Outokumpu Stainless Trademark
Inconel® is a Special Metals Corporation Trademark

Headers and Connections:
Dimple jacket "Half-Pipe" headers are directly welded to the vessel wall and are standard for thermal shock and most other applications for maximum fatigue resistance.
Dimple jacket "Box type" headers are more economical for low pressure and non-thermal shock applications and are welded directly to the dimple jacket material.
Jumper headers and many other types of headers are available for all heat transfer surfaces.
Available connection types include: NPT, Half-Coupling, Flanges (RFSO, RFWN, RFLJ, etc.), Tri-Clamp, Other


Typical Half-Pipe Header


Typical Box Header

DCI, Inc. is committed to being the premiere supplier of innovative solutions for our customers through the design and fabrication of stainless steel and alloy equipment.

Contact DCI today (sales@dciinc.com) and let our Sales and Engineering Professionals assist with your specific heat transfer applications.

Helpful information to help with your application is: tank volume, tank area available, desired temperature, heat transfer media, available media temperature, tank/product temperature, product data (viscosity, specific gravity, specific heat), time requirement, thermal shock/non-thermal shock, heat/cool/hold requirements.