

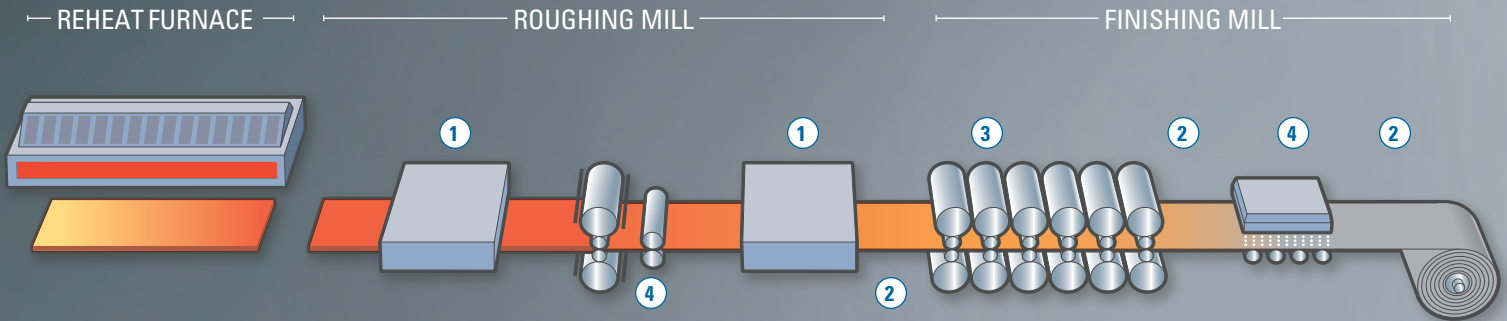


SOLUTIONS FOR HOT ROLLING MILLS

DESCALING • INTERSTAND COOLING
ROLL COOLING • LAMINAR COOLING
RUNOUT TABLE COOLING • LOOSE
SCALE REMOVAL • SPOT SPRAYING



HOT ROLLING MILLS
INTRODUCTION



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SPRAY TECHNOLOGY SOLUTIONS FOR EVERY AREA OF YOUR HOT ROLLING MILL

To ensure optimal steel quality, partner with Spraying Systems Co. for superior products and service. Our product offering includes a wide range of nozzles and headers, for descaling, cooling, scale removal and more. In addition, there is a local steel industry expert in your area to help assist with product selection, header and system design, cooling calculations, specialized testing and more. We have a decades-long, proven track record helping mills around the world minimize defects, reduce operating costs and simplify maintenance.

Please let us know how we can help you.



**HOT ROLLING MILLS
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SEE SECTIONS B AND D**

FULL CONE NOZZLES

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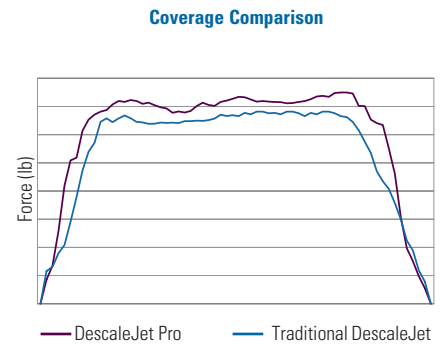
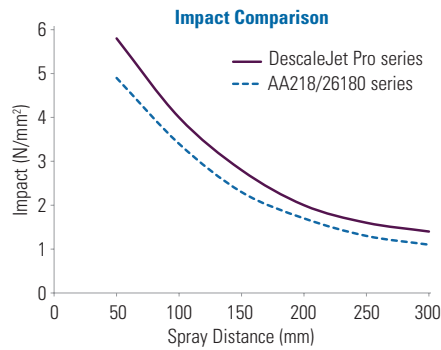
**MORE FULL CONE NOZZLES:
SEE SECTIONS B AND E**

DescalWare®, our proprietary software, simplifies nozzle selection and header design by using impact and coverage data collected in our spray laboratories. The software determines which nozzles provide the desired performance and graphically displays the optimal header layout including nozzle type, spacing, coverage, spray height, lead angle and impact values.



OVERVIEW: DESCALING NOZZLES

- High-impact descaling for scale-free steel
- Minimize turbulence and maximize impact
- Minimize water and pressure use without compromising performance
- Maximize effective coverage area



DESCALING NOZZLE OPTIONS

DescaleJet® Pro nozzles

- Advanced vane design reduces turbulence while increasing water velocity for improved impact and more effective descaling
- Orifice design produces large effective coverage and enables use of fewer nozzles and eliminates water waste
- Carbide material with finer grain structure reduces material wear and extends service life
- Wide range of threaded and weld connections, stabilizing attachments and tip bodies for easy integration in existing installations
- Ideal for thin strip, slab, plate, rounds and billets



26180/26190 DescaleJet and AA218/AA219 DescaleJet nozzles

- Internal vane and tight spray pattern increase impact
- Hardened stainless steel or tungsten carbide inserts extend service life
- Stainless steel body and spray tip holder provide protection from splashback wear and flying debris
- Self-aligning spray tips reduce maintenance/replacement time
- Flat seat design of the 26180/26190 series expedites maintenance; an internally threaded cap on AA218/AA219 protects against splashback damage
- 1" inlet connections with choice of threaded or weld bodies
- Ideal for thin strip, slab, plate, rounds and billets



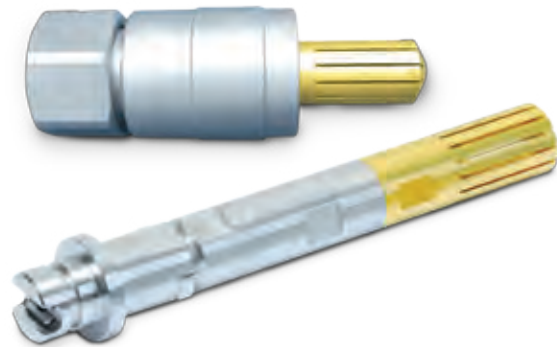
AA214 DescaleJet and Compact DescaleJet nozzles

- When used at spray heights of 2" to 6" (50 to 150 mm) and placed close together on a header, these nozzles provide the same impact level of higher capacity nozzles using less water
- Fluid passages minimize turbulence and produce thin, high-impact sprays
- Tungsten carbide inserts, pressed directly in nozzle bodies, provide long wear life, reduced maintenance time and lower replacement costs
- Choice of threaded and weld connections
- Ideal for thin strip, rounds and billets



HiScaleJet, HSJ and Mini HiScaleJet nozzles

- Comparable performance to AA218/AA219 and 26180/26190 DescaleJet® nozzles but with body styles to match different header designs
- HiScaleJet and Mini HiScaleJet feature a flat seated surface and long alignment flat on the tip body for positive alignment
- HSJ features a flat seating surface and larger and durable alignment lugs at the base of the tip holder
- Ideal for thin strip, slab, plate, rounds and billets



CVCN Check Valves

- Used with DescaleJet Pro nozzles, CVCN check valves prevent water from dripping after descaling and overcooling steel
- Allows faster sequencing of plates – no delays waiting for nozzles to shut off
- Eliminates water hammer effect by reducing nozzle turbulence and controlling turbulence in the header
- Minimizes pressure drop



DESCALING NOZZLE QUICK REFERENCE GUIDE

Model	Flow Rate Range at 2000 psi (138 bar) gpm (lpm)	Max. Operating Pressure psi (bar)	Spray Angle	Orifice Material
DescaleJet® Pro	3.5 to 52 (14 to 196.8) 3.5 to 35 (14 to 140) for Mini DescaleJet Pro	5800 (400) 4350 (300) for Mini DescaleJet Pro	20° to 40° at 2175 psi (150 bar)	Tungsten carbide
26180/26190 and AA218/AA219	5.7 to 52 (21.6 to 196.8)	3000 (207)	15° to 40° at 40 psi (3 bar)	Tungsten carbide or hardened stainless steel
AA214 DescaleJet and Compact DescaleJet	1.4 to 10.6 (5.3 to 40.1)	5800 (400)	18° to 40° at 40 psi (3 bar)	Tungsten carbide
HiScaleJet and HSJ Nozzles	4.2 to 52 (15.9 to 196.8)	4350 (300)	23° to 40° at 2175 psi (150 bar)	Tungsten carbide
Mini HiScaleJet	4.2 to 52 (15.9 to 196.8)	5800 (400)	20° to 40° at 2175 psi (150 bar)	Tungsten carbide

PLACING YOUR ORDER

Call your local steel specialist for application assistance or to place an order.



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FOR DETAILED NOZZLE PERFORMANCE DATA, SEE PERFORMANCE SECTION G



OVERVIEW: VEEJET® NOZZLES

- Flat fan spray patterns available in different styles and a wide range of flow rates and spray angles
- Large coverage area per nozzle reduces the number of nozzles required
- Narrow spray angle nozzles provide focused impact for side sweep applications
- Self-aligning nozzles, ideal for use in headers or manifolds, use a dovetail groove or locating flats to ensure repeatable pattern positioning; available with weld or threaded body connection options
- Ideal for use in roll cooling and interstand cooling

VEEJET NOZZLE OPTIONS



18897 and FSUN-S dovetail spray tips



49803 and 49807 dovetail spray tips



58606 self-aligning spray tip



58600-H3/4U with strainer

VEEJET NOZZLE QUICK REFERENCE GUIDE

Model	Connection/Type	Offset Angle	Flow Rate Range gpm (lpm)	Spray Angle	Materials
18897	Dovetail tip; threaded and weld body options	0°, 5°, 15°, 30°, 45° and 60°	1.0 to 44 (3.2 to 144)	15° to 110° at 40 psi (3 bar)	Brass, 303 stainless steel, hardened stainless steel, PVDF
FSUN-S	Dovetail tip; threaded and weld body options	0°, 5°, 15°	.06 to 109.7 (.2 to 353.6)	20° to 120° at 72 psi (5 bar)	Brass, 303 stainless steel, 316 stainless steel, PVDF
49803 and 49807	Dovetail tip; threaded and weld body options	5°	.05 to 13.6 (.22 to 50.5)	5° to 110° at 40 psi (3 bar)	Brass, 303 stainless steel, 316 stainless steel
58606	Self-aligning tip with locating flats; M body	15°	6.0 to 55.9 (34.2 to 180.2)	15° to 110° at 40 psi (3 bar)	303 stainless steel with brass strainer
58600	M	NA	7.1 to 141 (29 to 539)	50° to 95° at 40 psi (3 bar)	303 stainless steel with brass strainer

F = female thread; M = male thread.

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OVERVIEW: WASHJET® NOZZLES

- High-impact sprays and high pressure operation ensure optimal cleaning
- Made of 400 series stainless steel to provide longer wear life than traditional VeeJet® nozzles
- Flat spray nozzles provide an even edge fan type spray pattern
- Uniform spray distribution from .10 to 78 gpm (.39 to 290 lpm) by using optional internal guide vane to stabilize liquid turbulence
- Spray angles from 0° (solid stream) to 65° for MEG, WEG and MEG-SSTC; 5° to 80° for IMEG®
- Operating pressures from 300 to 4000 psi (20 to 275 bar)
- MEG-SSTC nozzles have tungsten carbide orifice inserts for maximum erosion resistance
- IMEG nozzles feature a patented design that minimizes turbulence and maximizes impact; higher impact per unit than MEG nozzles
- Ideal for light descaling of billets, blooms or rounds

WASHJET NOZZLE OPTIONS



WASHJET NOZZLE QUICK REFERENCE GUIDE

Model	Connection/Type	Connection Size (in.)	Materials
MEG	M	1/8 to 1/4	Hardened stainless steel
WEG	F	1/8 to 1/4	
MEG-SSTC	M	1/4	
IMEG	M	1/8 to 1/4	

F = female thread; M = male thread.

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OVERVIEW:

FLOODJET® NOZZLES

- Wide angle, deflected type flat fan spray pattern – angles from 73° to 153°
- Uniform spray distribution from .04 to 110 gpm (.14 to 410 lpm)
- Use when nozzles can be mounted horizontally
- Can be used with steam for blow-off applications
- TEK provides a tapered edge spray pattern to eliminate heavy edges while maintaining the wide spray pattern
- Ideal for operations requiring wide coverage such as blowing loose scale off strip

FLATJET® NOZZLES

- Narrow angle, deflected type flat fan spray pattern – angles from 15° to 50°
- Uniform spray distribution from .24 to 39 gpm (.91 to 144 lpm)
- Provides higher impact than other narrow angle nozzles
- Ideal for side sweep

FLOODJET NOZZLE OPTIONS



K
1/8" to 1" male conn.



TEK
1/8" to 1/4" male conn.

FLATJET NOZZLE OPTIONS



P
1/8" to 1/4" male conn.



P
3/8" to 3/4" male conn.

FLOODJET & FLATJET NOZZLE QUICK REFERENCE GUIDE

Model	Connection/Type	Connection Size (in.)	Materials
K	M	1/8 to 1	Brass, 303 stainless steel, 316 stainless steel
TEK	M	1/8 to 1/4	Brass, 303 stainless steel
P	M	1/8 to 3/4	Brass, mild steel, 303 stainless steel, 316 stainless steel

F = female thread; M = male thread.

FloodJet nozzles are also available in quick-connect versions.

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OVERVIEW:

H FULLJET® NOZZLES

- Solid cone-shaped spray pattern with round impact area
- Unique vane design minimizes turbulence to ensure uniform spray distribution and consistent spray coverage
- Large unobstructed flow passages minimize clogging
- Flow rates from 5.1 to 3686 gpm (21 to 13953 lpm)
- Ideal for plate cooling

MAXIMUM FREE PASSAGE FULLJET NOZZLES

- Patented vane design provides largest free passage of maximum free passage nozzles; ideal for use with fluids containing particulates
- More uniform spray distribution than other large free passage nozzles
- Uniform spray distribution from 1.4 to 119 gpm (5.3 to 470 lpm)
- Operating pressures up to 80 psi (6 bar)
- Spray angles: 60°, 90° and 115°
- Ideal for cooling slab and strip

FULLJET NOZZLE OPTIONS



FULLJET NOZZLE QUICK REFERENCE GUIDE

Model	Connection/Type	Connection Size (in.)	Materials
H	F, Cast	1-1/4 to 8	Brass, 316 stainless steel
HMFP	F	3/8 to 1-1/2	316 stainless steel vane and choice of brass or 316 stainless steel bodies
	F	1-1/4 to 1-1/2	316 stainless steel vane and 316 stainless steel body
HHMFP	M	3/8 to 1	316 stainless steel vane and choice of brass or 316 stainless steel bodies
	M	1-1/4 to 1-1/2	316 stainless steel vane and 316 stainless steel body

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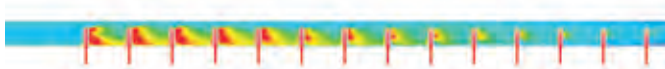
DESCALE HEADERS

OVERVIEW:

To ensure optimal descaling, we use DescaleWare®, our propriety software, for descale header layout. DescaleWare uses impact and coverage data collected in our spray laboratories to identify the nozzles and header layout that will provide the performance needed for your specific operation.

BENEFITS:

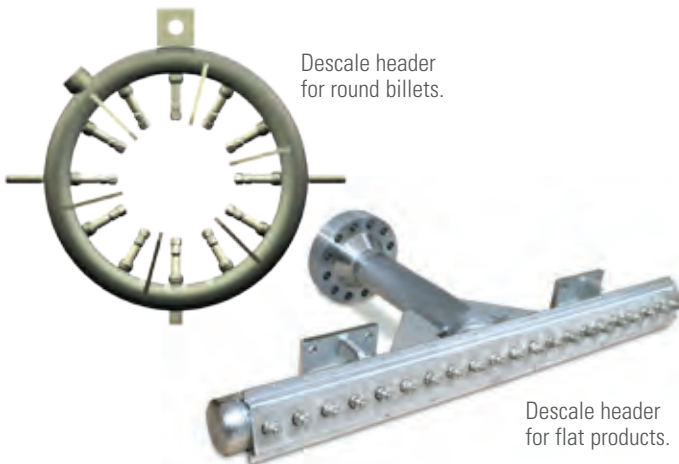
- Ensures headers are properly sized to match performance requirements
- Code compliance as required
- Single-source supply of headers and nozzles eliminates potential integration problems
- CFD modeling available to validate header design and reduce pressure loss and turbulence



This CFD model shows a 4" dia. header with 14 nozzles. The total flow is 743 gpm (2813 lpm) at 2300 psi (159 bar). The model reveals the velocity leading into the first six nozzles exceeds the recommended maximum of 15 ft/s (4.5 m/s). In fact, the entry velocity for the first nozzle is 25.7 ft/s (7.8 m/s).



This model shows what happens when the pipe dia. is increased to 6" and operating conditions remain the same. The entry velocity of the first nozzle is now well below the recommended value at 11.3 ft/s (3.4 m/s).



FOR MORE INFORMATION ON HEADER DESIGN AND SPECIFICATION GUIDELINES, SEE spray.com/steeltatalog/sectionC

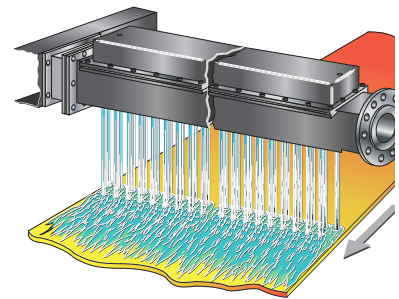
LAMINAR FLOW HEADERS

OVERVIEW:

Laminar flow headers provide consistent and cost-effective sheet cooling on runout tables. Operating at pressures as low as 0.9 psi (0.06 bar), laminar cooling uses water very effectively.

BENEFITS:

- Rod-like column of water from solid stream VeeJet nozzles is superior to U-tube nozzle cooling
- Header does not need to be filled or drained to interrupt the flow pattern enabling simplified header sequencing and reduced lag time
- An internal baffle plate ensures precise flow distribution and simplifies maintenance and replacement
- Slit-style laminar flow headers that produce an evenly distributed curtain-like sheet of water help reduce cracking and other defects



VEEJET® HEADERS

OVERVIEW:

Custom-designed headers equipped with VeeJet flat spray nozzles are ideal for cooling hot strip and plate products. Headers can be designed to allow use of VeeJet nozzles with different spray angles.

BENEFITS:

- Wide range of nozzle sizes, capacities, spray angles and materials
- Compact profile allows close positioning to target to maximize heat removal and extend roll life
- Overlapping patterns provide efficient, uniform cooling
- Suitable for use on runout tables, strip wash and lubrication

