Inconel 625 Weld Overlay Flange

Specification Data Sheet - CRA weld overlay / flange cladding weld overlay for sour, seawater, offshore and high-corrosion pipeline service

This data sheet summarizes practical specification points for an Inconel 625 weld overlay flange. The base forged flange carries the pressure load; the Inconel 625 / Alloy 625 layer protects the bore, sealing face, RTJ groove or other wetted surfaces. Final acceptance should be based on the machined overlay surface, not only the as-welded deposit.

Main acceptance focus	Typical use	Important note
Finished overlay thickness, final-surface PMI, PT on sealing areas, hardness when sour service applies, and dimensional check after machining.	Sour gas, seawater injection, produced water, chloride-bearing service, refinery process lines, offshore and subsea interfaces.	Project documents may specify Inconel 625, Alloy 625, UNS N06625 or ERNiCrMo-3 depending on whether base alloy or filler metal is being referenced.

1. Flange and Overlay Specification Range

Item	Recommended / Common Specification Basis
Product name	Inconel 625 weld overlay flange; Alloy 625 CRA weld overlay flange; flange cladding weld overlay flange
Flange / facing types	Weld neck, blind, RTJ, slip-on, custom forged flange; RF, RTJ or drawing-based facing
Dimensional standards	ASME B16.5 (NPS 1/2 to 24); ASME B16.47 (NPS 26 to 60); API 6A / API 17D for wellhead, subsea or project-specific interfaces
Pressure rating	ASME Class 150 to 2500 where applicable; ASME B16.47 Class 75 to 900 for large-diameter flanges; API pressure rating per project
Base materials	ASTM A105/A105N, A350 LF2, A694 F52/F60/F65/F70, A182 F22/F316/F51/F55 or project-specified forged material
Overlay alloy	Inconel 625 / Alloy 625 / UNS N06625; filler metal commonly ERNiCrMo-3
Overlay locations	Bore, raised face, RTJ groove, sealing face, neck transition, blind flange inner face or other wetted surfaces shown on drawing
Finished thickness	Project-specific. Common project practice often specifies a minimum finished CRA layer after machining, frequently 3.0 mm; final value must follow drawing/specification
Qualification	WPS / PQR / WPQ according to ASME Section IX or project requirement

2. Inconel 625 / ERNiCrMo-3 Reference Data

Reference data for INCONEL Filler Metal 625 / ERNiCrMo-3. Project acceptance shall follow the specified standard, filler MTC, approved WPS/PQR and purchase specification.

Parameter	Reference data	Parameter	Reference data
Specification	AWS A5.14 ERNiCrMo-3; ASME SFA-5.14; ASME IX F-No. 43	UNS	N06625
Ni + Co	58.0 min	Cr	20.0 - 23.0
Mo	8.0 - 10.0	Nb + Ta	3.15 - 4.15
C	0.10 max	Mn / Si / Cu	0.50 max each
P / S	0.02 max / 0.015 max	Al / Ti	0.40 max each
Min. tensile strength	105,000 psi / 724 MPa	Min. elongation	30%

Note: filler metal reference values do not replace flange pressure-temperature ratings, base forging mechanical properties or project design calculation.

Manufacturing and Inspection Data

Overlay quality is controlled by welding procedure, dilution control, machining allowance and final-surface inspection. The most important inspection point is the condition of the CRA surface after final machining.

3. Overlay Areas and Acceptance Meaning

Overlay area	Technical purpose	Key acceptance check
Bore overlay	Protects the internal flow path from sour, chloride-bearing or acidic medium	Finished bore ID, continuous CRA coverage, PMI on finished surface
Raised face overlay	Protects gasket contact area and supports sealing reliability	Flatness, surface finish, PT result, finished overlay thickness
RTJ groove overlay	Protects ring gasket groove in high-pressure sealing service	Groove profile, surface condition, dimensional tolerance, PT result after machining
Neck transition	Avoids exposed carbon steel near pipe-to-flange transition	Smooth transition and overlay continuity with connected clad/overlay pipe
Blind inner face	Protects dead-end area exposed to trapped or stagnant corrosive fluid	Full coverage of wetted surface and finished thickness after facing
Custom wetted zone	Matches valve, spool, manifold, wellhead or subsea drawing	Overlay boundary aligned with connected component drawing

4. Production Route and Process Control

Step	Control point for Inconel 625 weld overlay flange
Base forging review	Confirm base material, heat number, flange standard, pressure class, facing type and MTC before overlay work starts
Drawing / overlay-zone review	Mark bore, raised face, RTJ groove, neck transition or blind inner face; define machining allowance and minimum finished overlay thickness
WPS / PQR / WPQ	Review qualified weld overlay process, ERNiCrMo-3 filler metal, heat input range, layer sequence and welder/operator qualification
CRA overlay deposition	Use qualified GTAW, hot-wire GTAW, GMAW or approved process; multi-layer deposition is commonly used to reduce dilution risk
Machining	Final bore, face, groove and gasket surface dimensions must meet ASME/API/project drawing while keeping the minimum CRA layer
Final inspection	Perform PT, PMI, hardness, ferrite if specified, dimensional inspection and document review before packing

5. Inspection Checklist Before Shipment Release

Inspection item	Why it is required	Typical record
Finished overlay thickness	Confirms enough CRA layer remains after machining; as-welded thickness alone is not enough	Thickness report / inspection map
PMI / chemistry verification	Confirms final machined surface matches Alloy 625 / UNS N06625 after dilution and machining	PMI report / chemical analysis
PT on overlay surface	Detects surface cracks, pores and open discontinuities on sealing face, bore or groove	PT report
Hardness test	Important for sour service, HAZ control and NACE MR0175 / ISO 15156 review	Hardness report
Dimensional inspection	Checks flange OD, bore, thickness, bolt holes, RF, RTJ groove and gasket surface after final machining	Dimensional report
Document matching	Confirms heat number, base material, filler metal, overlay record, marking and packing list are traceable	MTC, WPS/PQR, packing list, photos

Buyer takeaway	Ask for overlay area drawing, minimum finished overlay thickness, final-surface PMI, PT report, hardness report if sour service applies, and dimensional report after machining. These records prove the flange is acceptable at the actual fluid-contact surface.

Selection, RFQ Data and Reference Basis

This page summarizes service selection, RFQ information and document package items that reduce the risk of site rejection or receiving inspection delay.

6. Service Selection Guide

Service condition	Why Inconel 625 overlay is reviewed	Procurement note
Sour gas / H2S service	Nickel-chromium-molybdenum alloy overlay helps protect wetted surfaces in sour and high-corrosion service	Review NACE MR0175 / ISO 15156, hardness, HAZ condition and final-surface PMI
Seawater injection	Chloride-bearing water can attack exposed carbon steel at bore, gasket face or transition areas	Define overlay on bore, raised face, RTJ groove and neck transition
Produced water / CO2 service	Water, CO2, chlorides and dissolved gases can create local corrosion risk at flange wetted surfaces	Confirm Alloy 625 suitability against medium composition and temperature
Offshore / subsea interface	High document demand and sealing reliability around RTJ grooves, valve faces and manifold interfaces	Require PT/PMI/dimensional reports and TPI witness points if needed
Clad pipe / CRA-lined pipe connection	Overlay flange keeps the corrosion-resistant path continuous across the flange connection	Align overlay boundary with connected pipe, spool or valve drawing

7. RFQ Data Required from Buyer

RFQ item	Required information
Flange definition	Type, NPS, pressure class, facing type, standard/drawing revision and quantity
Base forging	Material grade, heat treatment requirement, sour service requirement if applicable
Overlay requirement	Inconel 625 / Alloy 625, overlay area, minimum finished overlay thickness, machining allowance and filler metal requirement
Service data	Medium, pressure, temperature, H2S, CO2, chloride content, water cut, pH and oxygen ingress if available
Inspection scope	PT, PMI, hardness, dimensional inspection, ferrite if applicable, TPI witness / hold points
Documents	MTC, filler MTC, WPS/PQR/WPQ, overlay report, PMI report, PT report, hardness report, dimensional report, packing list and marking photos

Reference Basis Used for This Data Sheet

Reference	Use in this data sheet
ASME B16.5	Pipe flanges and flanged fittings, NPS 1/2 through 24, including pressure-temperature ratings, materials, dimensions, tolerances, marking and testing
ASME B16.47	Large-diameter steel flanges, NPS 26 through 60, including pressure-temperature ratings, dimensions, tolerances, marking and testing
ASTM A105 / A350 / A694 / A182	Common base forging material families for pressure piping flanges and high-pressure transmission service
AWS A5.14 / ASME SFA-5.14 ERNiCrMo-3	Nickel alloy filler metal designation commonly used for Inconel 625 / Alloy 625 overlay
ASME Section IX	WPS, PQR and welder/operator qualification basis for welding procedure control
NACE MR0175 / ISO 15156	Material selection and qualification reference for H2S-containing oil and gas production environments

Final note: Values in this data sheet are for specification drafting and procurement review. The final purchase order, project specification, approved drawing, WPS/PQR and inspection test plan take precedence.