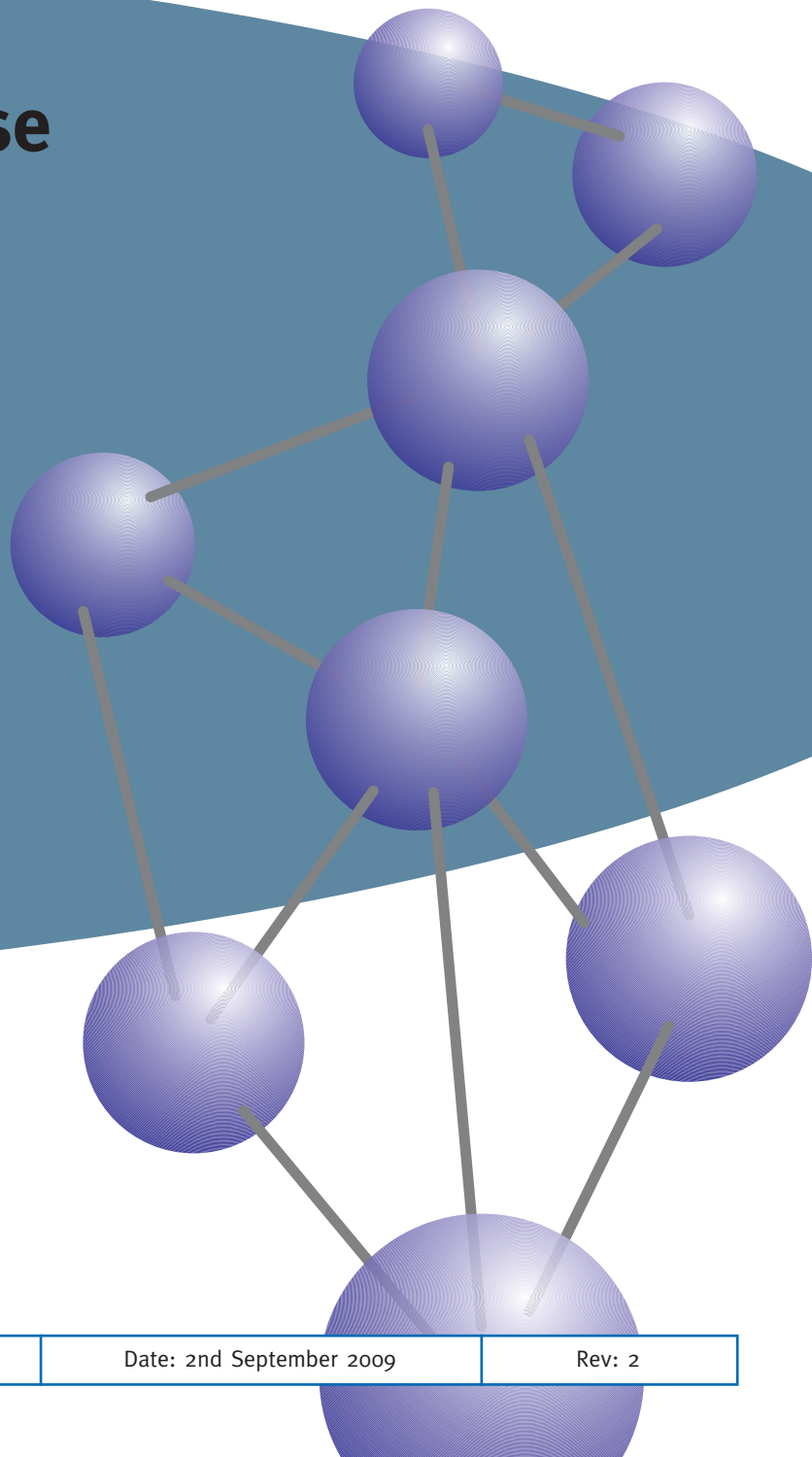




Langley Alloys

Material Purchase Specification for

FERMONIC 50 High Strength Grade - Bar



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DOCUMENT No. MLA-MPS-25VH-BAR

Date: 2nd September 2009

Rev: 2

1.0 Scope

This specification is for the purchase of bar in FERMONIC 50 austenitic stainless steel. The material is to be manufactured in accordance with ASTM A314, ASTM A479, A276 and ASTM A182 as grade XM-19, S20910

2.0 Related Documents

ASTM A479 and ASTM A276, S20910, XM-19

3.0 Production Processes

Production process shall be in accordance with internal written Langley Alloys Procedures. Melting is by electric induction and further refining may be applied. At each stage of production, melt and batch traceability shall be maintained.

4.0 Chemical Composition

FERMONIC 50 ingots are produced to a specified melting procedure using high grade in-feed materials. Chemical analysis is carried out during analysis and on the final poured metal. The final composition is according to the following:

| Cr | Mo | Mn | N | Ni | Nb | Si_{max} | C_{max} |
|---------------|------------------------|------------------------|---------------|---------------|---------------|-------------------------|------------------------|
| 20.5- 23.5 | 1.50- 3.00 | 4.00- 6.00 | 0.20- 0.40 | 11.5- 13.5 | 0.10- 0.30 | 1.00 | 0.06 |
| V | S_{max} | P_{max} | Fe | | | | |
| 0.10- 0.30 | 0.030 | 0.045 | Remainder | | | | |

5.0 Condition of Supply

Bar shall be delivered in a warm worked or cold worked condition.

6.0 Mechanical Properties

6.1 Frequency of Testing

Mechanical testing shall be performed on each melt of material per heat treatment batch.

6.2 Tensile Testing

Tensile testing shall be carried out in accordance with ASTM A370 or EN10002-1 at room temperature in a longitudinal direction for bar.

Minimum properties are to be as follows:

| | |
|-----------------------|--|
| 0.2% Proof Stress | 690 N/mm ² [100ksi] minimum |
| Tensile strength | 862 N/mm ² [125ksi] minimum |
| Elongation, 4D (min) | 20% minimum |
| Reduction of Area | 40% minimum |
| Hardness (HRC) | 25-35 |
| Charpy V-notch | 54J minimum |
| Magnetic Permeability | <1.02 |

8.0 Non Destructive Testing

Each complete batch of material is ultrasonically tested in accordance with ASTM A388, BS EN 10228, BS EN 12223 and BS EN 12668. Inspection will be to meet the requirements of API 6A Section 7.5.2.3.14. All NDT personnel must be qualified to at least Level 2 of SNT-TC-IA.

Reference Blocks used for the ultrasonic examination are as follows:

| Section Thickness | Diameter of Flat Bottomed Vertical Holes and Central Horizontal Hole |
|----------------------------------|--|
| Up to and including 38mm | 1.6 mm |
| Over 38mm. to 150mm. (inclusive) | 3.2 mm |
| Over 150mm | 6.4 mm |

Any defect which causes a signal either equal to or greater than the signal produced by the calibration standard (having made allowance for any differences of attenuation between test block and material under test) is deemed to be unacceptable. In such cases, the material under test is rejected and scrapped.

9.0 Inspection

All bars are inspected by the manufacturer before despatch with the following requirements for dimensional tolerances and identification.

All bars shall be straight to within 1 part in 800

All bars shall be free of surface defects such as laps, cracks and shall undergo 100% ultrasonic inspection as given in section 8.

All bars shall be in the proof machined condition of surface finish of 125µm CLA or better, with the following tolerances on diameter:

| | |
|-------------------------------------|-----------------------|
| <i>Bars up to 30mm diameter:</i> | <i>+0.15mm/-0.0mm</i> |
| <i>Bars 31 mm to 80mm diameter:</i> | <i>+0.25mm/-0.0mm</i> |
| <i>Bars 81mm to 200mm diameter:</i> | <i>+2.00mm/-0.0mm</i> |
| <i>Bars above 200mm diameter:</i> | <i>+3.00mm/-0.0mm</i> |

Bars are supplied in random lengths of typically 2.5-3.7m, unless cut pieces are to be supplied. Bar of lengths up to 6m would be acceptable.

Supply of full bars of shorter lengths than 2.5m would be subject to agreement on a case by case basis.

For the supply of cut pieces, tolerance on the cut lengths would be -0, +6mm

Bars of diameter up to and including 25mm are bundled together in single batches only and securely labelled.

Bars of diameter above 25mm are hard stamped on the bar ends.

10.0 Identification

Articles shall be suitably identified with the manufacturer's stamp, the batch number and the alloy code (25V). The batch number uniquely defines both the melt and heat treatment batch from which the bars are taken.

For forgings, the method of identification, whether by labelling or stamping, will depend on the size and shape of the forgings and shall be agreed between the customer and material's supplier.

11.0 Certification

Test Certification is supplied to BS EN 50049.3.1. with each batch of bar and/or forgings. Details on the certificate shall include as a minimum:

- Product description and specification
- Condition of Condition
- Langley Alloys and customer's order numbers
- Results of chemical analysis and room temperature tensile tests in accordance with this specification
- Certificates relating to NDT testing
- Signature of an authorised signatory of Langley Alloys

Additional documentation can be supplied by agreement between the materials supplier and customer at the enquiry and order stage.



Langley Alloys

The Wharf, 504-506 Lowfield Drive, Newcastle, Staffordshire ST5 0UU
Tel: +44 (0)1782 610 250 Fax: +44 (0)1782 612 219
Email: sales@langleyalloys.com Web: www.langleyalloys.com