

ISO/TR 17671-6:2005-02 (E)

Welding - Recommendations for welding of metallic materials - Part 6: Laser beam welding

| Contents | | Page |
|---------------------------------------|--|-------------|
| Foreword | | v |
| Introduction | | vi |
| 1 | Scope | 1 |
| 2 | Normative references | 1 |
| 3 | Terms and definitions | 3 |
| 4 | Health and safety and protection of the environment | 3 |
| 5 | Quality requirements | 3 |
| 6 | Equipment | 4 |
| 6.1 | General | 4 |
| 6.2 | Provisions for acceptance testing | 4 |
| 6.3 | Provisions for maintenance and calibration | 4 |
| 7 | Qualification of welding personnel | 4 |
| 8 | Welding procedure specification | 5 |
| 9 | Welding procedure test | 5 |
| 10 | Consumables | 5 |
| 10.1 | Filler metals | 5 |
| 10.2 | Gases | 5 |
| 11 | Design | 6 |
| 11.1 | Overall design of structure or product | 6 |
| 11.2 | Joint design | 6 |
| 11.3 | Joint preparation | 6 |
| 12 | Laser beam welding | 7 |
| 12.1 | Characteristics | 7 |
| 12.2 | Advantages and limitations | 9 |
| 12.3 | Assembling and fixtures | 10 |
| 12.4 | Process control | 10 |
| 12.5 | Inspection and testing | 10 |
| 12.6 | Imperfections | 10 |
| Annex A (informative) Equipment | | 11 |
| A.1 | Description of laser process | 11 |
| A.2 | Laser beam sources | 12 |
| A.3 | Guiding, shaping and focussing the beam | 14 |
| A.4 | Devices used to create a relative movement between the laser beam and the work piece ... | 18 |
| A.5 | Fixtures used to hold the work piece | 18 |
| A.6 | Cooling system | 19 |
| A.7 | Control systems | 19 |

| | |
|--|-----------|
| Annex B (informative) Laser beam properties | 20 |
| Annex C (informative) Information about weldability of metallic materials | 22 |
| C.1 General | 22 |
| C.2 Steels and iron alloys | 22 |
| C.3 Nickel alloys | 24 |
| C.4 Aluminium and magnesium alloys | 24 |
| C.5 Copper and its alloys | 24 |
| C.6 Refractory and reactive materials | 24 |
| C.7 Titanium and its alloys | 25 |
| C.8 Dissimilar metals | 25 |
| C.9 Non-metals | 25 |
| Annex D (informative) Information about causes of weld imperfections and their prevention | 26 |
| Annex E (informative) Beam control and monitoring | 28 |
| E.1 General | 28 |
| E.2 Focal point | 28 |
| E.3 Beam alignment and pilot beam coincidence | 28 |
| E.4 Beam power | 29 |
| E.5 Beam power distribution | 29 |
| E.6 Nozzle alignment | 29 |
| E.7 Pulsed beam power data | 30 |
| E.8 Manipulators, guides, etc | 30 |
| Annex F (informative) Laser beam processing | 31 |
| F.1 Laser beam cutting | 31 |
| F.2 Laser beam drilling | 33 |
| F.3 Laser beam surface treatment | 33 |
| F.4 Laser beam cladding | 34 |
| F.5 Laser beam marking and engraving | 35 |
| Bibliography | 36 |