NEW EQUIPMENT & SYSTEM APPROVAL PROFORMA

Ref: 12/14069.

Note: the prompts given below are only a guide to the information required for approval. Dependent on the type of equipment or system that requires approval delete any section that is not applicable or include additional information if necessary. Mandatory fields are marked with an asterisk (*).

1 **Equipment or System to be approved** *

- Railtrac BV / BVR mechanised system with supporting arc welding equipment
- Origo Mig 4001i A24 and Origo Feed 4804 MA24
- KHM 405 YSX Engine Driven Welder with Origo Feed 484
- OK Tubrodur 15.43 and OK Tubrodur 15.65 Flux cored Self Shielded arc welding wires for the repair and maintenance of carbon steel rail and austenitic manganese rail steel components.

2 **Originator** *

Damian Cann ESAB Country Manager Asia Pacific and Milo Dumovic ESAB Global Manager Repair and Maintenance. Supported by Gunaratnam Jayakumar ARTC's Senior Delivery Engineer on the Hunter.

3 **Introduction** *

Railtrac BV/BVR 1000 is mechanised programmable system for applying OK Tubrodur 15.43 and OK Tubrodur 15.65 weld deposits with the aim of repairing carbon and austenitic manganese steel rail defects**.**

4 **Determination of Need** *

Railtrac BV/BVR 1000 in combination with OK Tubrodur 15.43 and 15.65 represent the sound, cost effective solution(s) for the continuous repair and maintenance of the rail weld defects. The system is improving existing solutions for the repair and maintenance of the rail system by eliminating subjective operators errors, provide more consistent, reliable, repeatable and reproducible weld deposit thus significantly improving of quality repaired defects.

Railtrac BV/BVRR1000 advantages can be summarised as:

- Reliable, constant, and reproducible welding parameters during repair process. In particular amps, volts, arc travel speed, heat input, Electrical Stick Out (ESO), steady tracking etc.
- Safety protection of the operators from fume exposure and electrical shock (Voltage Reduce Device).
- Railtrac BV/BVR 1000 provides fume protection in particular exposure protection to the high concentration to Manganese fumes during Austenitic Manganese castings repair. OK Tubrodur 15.65 alloy designs for the repair of Austenitic Manganese rail castings provides low level of Nickel and Chromium, minimizing harmful fume effects to the operators, in order to deliver required results. Other competitor products are based on alloy design with maximum Manganese level of 21%!
- Ability to control OK Tubrodur OK 15.43 welding parameters at high preheat temperatures (>350 °C) in particular stick out and travel speed.
- Defect free weld deposits achieved by Tubrodur OK 15.43 and 15.65.
- Constant wire feedability.
- Eliminates semiautomatic/manual operator's errors such as: Ropy Weld Bead, Poor Penetration, Porosity, and Inadequate Electrical Stick Out.
- Lower heat input in particular, when welding austenitic manganese crossing by adequate adjustment of arc travel speed in conjunction to special design of the high alloyed sheet with OK OK Tubrodur 15.65 wire that require lower thermal conductivity contributing to lower heat input.
- Flexibility of equipment to be used as semiautomatic arc welding process as well as applicability of the system to be used on the other welding projects such as steel constructions, fabrications, pressure vessel, shipbuilding, general repair and maintenance **applications etc.**

OK Tubrodur 15.65 and OK Tubrodur 15.43 advantages can be summarised as:

- Extended rail service life via improved wear and impact resistance of carbon rail steel and austenitic manganese rail steel achieved by adequate alloy design, mechanical, microstructural and chemical properties of weld deposits on the rail. All test reports, WPS and data sheets are provided.

5 **Significant Change or Not**

This change in equipment or system is assessed as Significant (new supplier).

6 **Review Panel**

- John Furness - Manager Standards
- Gunaratnam Jayakumar - Senior Delivery Engineer, Hunter Valley
- Tim Calver - Track Standards and Technical Services Engineer

7 **Safety**

The ESAB Railtrac BVR system is a programmable mechanised transportation system for the repair of rail track with the Self Shielding Flux Cored Arc Welding process. The system clamps quickly and simply to the rail head and holds a standard GMAW welding torch. The system is programmable to repair weld specific types of defects in standard and head hardened rail. By changing the welding consumable the equipment can be used to repair Austenitic Manganese castings as well.

Major advantages of the system are constant travel speeds which generate flat level weld deposits and produce consistent arc energy input (heat). Subsequently the weld deposit is more homogenous and requires less surface finishing than a manually applied deposit. The ESAB Railtrac BV/BVR system removes operator skill error and provided welding procedures are adhered to, the system generates consistent results providing ARTC with greater consistency of weld repairs applied to rail defects.

- Electric Welding equipment has potential electrical hazards present. Observe the safety guidelines of AS 1674.2.
- The control system of the ESAB Railtrac BVR operates on low 42V.
- Arc Welding produces heat, bright light, and ultra violet radiation. Operators must wear suitable clothing and Australian Standard approved welding eye protection.
- Contact with hot rail, weld spatter and slag must be avoided.
- Welding Fume from Chromium rich welding consumables used in the repair of rail is hazardous and operators should wear Australian Standard approved positive pressure air fed welding helmets when welding.
- Lifting – the equipment may be required to be lifted from vehicle to track and correct manual handling techniques and safe manual handling loads should be observed. Equipment weight's range from 41kg for the power source, 19kg for the wire feeder and 16kg for the welding wire. The Railtrac BVR unit weighs 7kg.
- Moving equipment – ensure the travel path of the equipment is clear of cables, or any foreign bodies. Ensure that hands are kept well clear of any potential pinch points.
- Repair of Carbon Steel rail requires the application of pre-heat. Ensure that all gas equipment used for pre-heating rail is compliant to AS 2473 and AS 4267.
- Care should be taken to avoid contact with pre-heated areas, heat overflow from the torch and any potential fire hazard.

ESAB has developed safe work practices and appropriate Welding Procedures for the rail defects experienced by ARTC and this information has been shared with and training has been conducted with the operators of the equipment.

8 **Performance and Suitability**

There is no conflict with existing ARTC practices.

There is no applicable Australian Standard for the ESAB Railtrac BVR however ESAB guarantee's the system conforms to ISO 12100-2, EN 60204-1, EN 61000-6-2 and EN 6100-6-3

The ESAB Railtrac BVR system and associated consumables have been demonstrated to ARTC and it's contractors with excellent results which warrant a type approval so that further in-service evaluation can be made. System operators have been trained by ESAB in the safe and successful operation of the equipment**.**

DECLARATION OF CONFORMITY

ESAB AB, Welding Equipment, SE-695 81 Laxå, Sweden, gives its unreserved guarantee that automatic welding machine ***Railtrac BV1000/BVR1000*** from serial number ***948*** (1999 w.48) complies with standard EN 12100-2 and EN 60204-1, in accordance with the requirements of directive (98/37/EEC) and with standard EN 61000-6-2 and also EN 61000-6-3, in accordance with the requirements of directive (2004/108/EEC).

(i) **Use in other rail networks**

Croatia. Hvratske Zeljeznice. Equipment and Consumables.

Czech Republic. Czeské Dráhy. Equipment and Consumables.

Denmark. DSB. Equipment and Consumables.

Finland. Finnish Rail Administration. Equipment and Consumables.

Hungary. Hungarian State Railways. Equipment and Consumables.

Iran. Ministry of Railways. Equipment and Consumables.

Latvia.Latvijas Dzelzcels.Equipment and Consumables.

Lithuania.Leituvos Gelezinkeliai.Equipment and Consumables.

Norway. Banestyrelsen. Equipment and Consumables.

Russia. Fnisht. Equipment and Consumables.

Sweden. Banverket. Equipment and Consumables.

South Africa. Spoornet. Equipment and Consumables

United Kingdom. Network Rail. Equipment and Consumables.

COPIES OF NETWORK RAIL UK AND GERMAN DB APPROVALS ATTACHED

(ii) **Use in the ARTC network**

- OK Tubrodur 15.65 used for RBM 402A crossing repair. ESAB Report 201111205-Rev 2 confirmed extraordinary performance of the crossing at Pts. No: 108A Pts. Equipment no: 116546. Location: Metford. Km: 183.408.
- OK Tubrodur 15.43 Test reports ESAB DTCM-11308b and DTCM-11308c, confirmed compliance to AS1085, AS2576 etc standards and ARTC internal documentation. Rail grade HHR.

(iii) **Issues arising from usage of the equipment/system**

No issues.

(iv) **Changes required to infrastructure or systems for use of the equipment**

No changes required. System is compatible with existing infrastructure. Coding in Ellipse, Maximo and SAP can be added for this work.

9 **Reliability**

Between Australia and New Zealand, there are >10 similar ESAB Railtrac systems operating successfully for more than two years.

There are over 300 Railtrac BV/BVR systems operating globally for more than 10 years.

The system has proven itself in service.

10 **Maintainability**

ESAB Equipment is supported in Australia by the sales company ESAB Australia and a network of accredited independent service agents.

Factory conducted repair training has been carried out across Australia in December 2012 and in particular, 5 service technicians from the Hunter Valley have been trained to maintain and repair the Railtrac BV/BVR system.

Operation manual is supplied as an addendum to this submission and technical service manuals are with the service agents.

This equipment will be adopted by ARTC contractors not ARTC directly at this stage.

At this time there is no licence agreement in place however a technology transfer agreement between ESAB and its customers will be required for the equipment and process once approval has been granted by ARTC.

11 **Approval** *

To be used for the repair of Australian Standard (AS 1085.1) Standard Carbon and Head Hardened plain rail and crossing components defects in all rail profiles. Repair of Authentic Manganese crossing components in workshop and minor repairs in field.

CONSUMABLES

- OK Tubrodur 15.43, 1.6 mm, GIN 1543167630 (Standard Carbon and Head Hardened rail)
- OK Tubrodur 15.65, 1.6 mm, GIN 1565167730 (Austenitic Manganese crossing)

EQUIPMENT

- Railtrac BV 1000 GIN; 0398145003, Railtrac BVR 1000 GIN; 0398145003
- Origo™ Mig 4001iA24 Mig4001i, GIN: 0460455884
- Origi™Feed 3004/4804 MA23, MA24 GIN: 0460526887;0460526987, 0460526889, 0460526989
- Origo Feed 484 M13 GIN; 0459116874, 0459116964
- KHM 405 YS/YSX, GIN: 0794020890

12	**Conditions of Approval** *						
	Only to be used for surface repairs. **NOT** to be used to join rails. Only to be applied by operators qualified to ESAB procedures and strictly complying with the following documents; • No 20111205- Rev 1- ESAB Wire feed flux cored self-shielded ARTC Welding process manual • No WPS #: ARTC Carbon Rail 05122011:- Welding Procedure Specification – Standard carbon and Head Hardened Rail • No WPS 05122011 ARTC AMC RBM - Welding Procedure Specification - Austenitic Manganese crossing. • Safety documents and equipment, especially regrading airflow helmets and fume extraction units. Surface geometry to comply with ARTC standard ETM-01-01 and NDT with ETE-01-03. Staff register to be maintained as per procedures.						
13	**Does the Originator accept the additional Conditions of Approval as set by the Review Panel:**	**Yes**	☒	No	☐	N/A	☐

14	**Sign off**			***ARTC office use only***
	Review Panel:			
	J Furness		Date:	29/2/2012
	G Jayakumar		Date:	1/3/2012
	T Calver		Date:	22-2-12

Approved by ARTC Operational Safety & Environmental Review Group 13 March 2012