

## Tata Steel Technical Standard

### S2628101      Radio controlled cranes and machines

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#### **Information and changes**

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# 1 Introduction

On the Tata Steel site IJmuiden, locomotives, wagon pushers, cranes and other machines are radio controlled. The purpose of this Tata Steel Standard is to guarantee safety when using radio-controlled machines.

The large concentration of radio signals in the ether makes it necessary to make agreements about the permitted frequencies at the IJmuiden location, the supplier and system choice and the request and coordination procedure when replacing or installing a new installation of radio controls.

This standard applies to radio-controlled machines, such as cranes, locomotives, hoists, drones, etc..

This standard does not apply to radiographic signals that are not intended for direct control purposes, such as wireless sensors, WLAN, RFID, etc., except for those in the 433 MHz and 869 MHz band.

See also *veiligheid.tatasteel.nl*, *en*, *Regulations*, *QHSE-procedures*, *Chapter 1.03 Transceiver Equipment*.

(Directe link: <https://www.tatasteeleurope.com/health-and-safety/access-and-safety-ijmuiden>).

## 2 Guidelines

For Tata Steel IJmuiden, GIS IWS INF TES controls the frequency management and issuance of all radio frequencies, including the 433-434 MHz and 869 MHz frequencies.

### 2.1 Locomotives and wagon pushers

For the Locomotives there is one (1) frequency available (450.970 MHz). All Locomotives can be controlled remotely with this frequency. **Cantron EC/LO MX** equipment must be used to guarantee that all Locomotives can operate at the same frequency without (safety) problems.

Two (2) frequencies are available for the Wagon pushers:

450.930 MHz: **Cantron EC/LO MX** equipment

450.950 MHz: **Cantron EC/LO Vario** equipment

### 2.2 Production cranes

Production cranes are indispensable for production work and can endanger production in the event of a failure. The basic principle for the radio-controlled operation of cranes is that the operator can also carry out crane auxiliary tasks on the floor in addition to the specific crane task.

For the production cranes, three (3) frequencies in the 451 MHz band can be used permanently for Tata Steel IJmuiden with a wide range of radiographic controls, the system used has been chosen such that up to seven (7) cranes can be operated in the same area with the same frequency. In a kind time-division multiplex system, these seven (7) cranes can work independently of each other.

Use must be made of **Cantron LRC TDMA** equipment.

### 2.3 Other machines (workshop and assembly cranes, drones, etc.)

For all other applications, frequencies in the 433-434 MHz and in the 869 MHz bands are available.

The AT (Telecom Agency) – part of the Ministry of Economic Affairs – does not use frequency coordination or broadcasting licenses for these bands. Approved equipment can be used anywhere in the Netherlands.

To prevent unsafe situations from arising, it applies to the Tata Steel site in IJmuiden that these frequencies cannot be used freely. **GIS IWS INF TEL** allocates the frequencies in these bands for all equipment.

All requests for new and replacement of remote controls must also be reported to: HTD.ELT.IKA.MRB.HFQ.

When ordering the equipment it must be specified that it will be used at Tata Steel in IJmuiden at the supplier! This in connection with agreements made regarding safety and implementation of this equipment at Cattron.

This concerns the following configuration:

- RC equipped with harness belt
- 2 pieces of high capacity batteries
- Standard 230 VAC charger
- On/off switch on top if space is available for this
  - If it must be on the side, it must be the more robust 22 mm variant
- No key switch
- Tilt protection
- External buzzer
- Preference is given to the more robust and adequate responsive V14 controllers instead of the V20's. The V14 also has a much longer lifespan
- No scan in RC (for 433 MHz & 869 MHz systems)
- Signal button on the side
- No display (except for projects for which they are clearly needed)
- Standard receiver with or without antenna connector & antenna kit, depending on the project.
- MMCU4 always with external antenna connector and antenna kit
- Deadman button on the controllers is not required
- On the TDMA frequencies (451.010 MHz, 451.030 MHz & 451.050 MHz) only EC40 telegram format
- Always offer a spare RC

## 2.4 Mobile communication (PMR466)

PMR466 (Private Mobile Radio) is a wireless system for mobile voice communication over short distances. The (often) portable equipment in this band can be used license-free throughout the Netherlands, which makes nuisance unwanted co-use not inconceivable.

Because it concerns small equipment, its use cannot be checked/monitored. **For that reason PMR466 is not suitable for work where safety must be guaranteed.**

## 2.5 Request procedure

All requests for frequencies go through the Service Portal in Service Now.

(Direct link:

- [https://tseprod.service-now.com/sp?id=sc\\_cat\\_item&sys\\_id=68bb9a3fdbba7b00a673a1ea4b961928&sysparm\\_category=bc14e30ddbc43300a673a1ea4b961952](https://tseprod.service-now.com/sp?id=sc_cat_item&sys_id=68bb9a3fdbba7b00a673a1ea4b961928&sysparm_category=bc14e30ddbc43300a673a1ea4b961952)).

### 3 Points of attention when choosing a supplier and system

- For radiographic controls of locomotives and production cranes, the supplier and system choice is fixed (see section 2.1 and 2.2).
- For ProfiBus related connection to the RGB receiver of Cattron an the PLC, the following is strongly recommended by the manufacturer for all versions with Profibus. This must be done in the PLC:

#### - ProfiBus Displacement data bit, motion-active/inactive

Within the ProfiBus data, this is provided in two extra bits (X + Y). The precise position of these bits is determined by the Application Engineering Group of the factory and/or Service Units. In the absence of the necessary knowledge, support can be requested via the **HTD.ELT.IKA.MRB.HFQ** department.

The output voltage of these two bits is used as a secondary protective measure. The following statuses are possible:

nr.	Bit X motion	Bit Y motion	Status	Action
1	0	0	Forbidden combination	Block machine movement
2	0	1	Drives into neutral	Block machine movement
3	1	0	One or more drives active	
4	1	1	Forbidden combination	Block machine movement

#### - ProfiBus 8-bit data telegram counter

Each ProfiBus data telegram contains an 8-bit counter. This counter is incremented by one after each received telegram.

If the MCU does not receive any telegrams, the counter is at zero. In the case of a passive stop situation, it takes a maximum of two seconds for the counter to go to zero.

The counter is sent with the first eight bits of the ProfiBus data. The PLC must verify and check that this counter has been changed at least every 500 ms; if the counter remains unchanged for 500 ms, the system must be assumed to be faulty or in a passive stop (no RF telegram) and the machine must be turned off.

- If the repair (including HF parts and circuit boards) is to be assigned to **HTD.ELT.IKA.MRB.HFQ**, the choice is limited to the Cattron company.
- They cannot provide support for equipment from other suppliers.

- Weight of the sender; important weight contribution are the robust controllers and the battery:
  - Many of the transmitter cabinets at 433-434 MHz and 869 MHz suppliers are quite vulnerable in terms of control switches. This light version is a general wish to reduce the weight of the sender, but it remains important that handing in the robustness of the sender is also justified at the desired workplace.
- RGB receiver – (external) antenna: Due to the transmitting power of the RGB controller and possible disturbances in the factories due to building/installation constructions or the load in the crane, it may happen that a receiver does not receive the signal properly and that an external antenna is needed. To ensure that the correct configuration is mounted, the proposal must be approved by the **HTD.ELT.IKA.MRB.HFQ** department. For this, an order must be made to **HTD.ELT.IKA.MRB.HFQ**, stating the assessment of RGB configuration and the following appendices must be added: drawing(s) of the situation (receiver location and RGB position) and the specifications of the RGB configuration.
- The carrying method of the transmitter must be ergonomically.

## 4 Infrared remote control

This technology is no longer used within Tata Steel IJmuiden, given the bad experiences from the past.



## 5 Regulations

The following standards must be met:

- NEN-EN-IEC 60204-1: Safety of machines - Electrical equipment of machines - Part 1: General requirements
- NEN-EN-IEC 60204-32: Safety of machines - Electrical equipment of machines - Part 32: Requirements for lifting and hoisting equipment

This contains aspects that the wireless remote control must comply with.

At Tata Steel IJmuiden, the ATVK (General and Technical Regulations for Cranes) and the regulations and provisions relating to the electrical installations on cranes apply:

- Tata Steel Guideline R1 10 51 02: "General and Technical Regulations for Cranes".

These regulations naturally also apply to the conversion of the cranes for radio control.

In addition, the RGBs (Cattron (Theimeg / Laird)) must be submitted to the department for inspection in case of deviations: **HTD.ELT.IKA.MRB.HFQ.**

## 6 Statement

### Version 1.0 (Jan. 2012):

New standard. This new standard is based on technical directive R2 62 80 01 which fell into disuse.

### Version 2.0 (July 2016):

Standard adjusted. Radio controls have been renamed and types have been modified. In addition, the routing of frequency registration is adjusted.

### Version 3.0 (Jan. 2020):

Standard adjusted. Routing to the intranet adjusted and requirements of the RC identified.

### Version 4.0 (June 2020):

Standard adjusted. Annual inspection RGB removed.

### Version 5.0 (January 2022):

Standard adjusted. Point of attention: ProfiBus connection and antenna due to transmit power adjustment added.