RAMS

NIK5.3#5 IN-Kind – Project
Test Package for Linear Motion Technology

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Version 1.0 | Date: 25.05.2018

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Document status

Revision	Reason for revision/ Description of amendment	Date
1.0	Initial version – Safety Analysis Report	25. May 2018

Content

Safety Analysis Report

Within this project, there will be no radioactive radiation effects, since the test bench will not be fixed installed within a radiation zone like a neutron scattering instrument. Even the use of dangerous material is not an issue in this project. The main risks that can appear in this project are electrical, mechanical, electromagnetic or temperature origin. That kind of problems are described in more detail in the Hazard / Risk analysis document “IHA for Linear Motion Test Bench_V1.0.xls”. Corresponding safety arrangements for possible risks in this project will now be listed continuously.

Safety arrangement in consequence of mechanical issues

Integration of an emergency stop system can be one safety arrangement in consequence of mechanical issues. Emergency stop is designed to eliminate as quickly as possible the risks caused by dangerous movements of the linear motors. The emergency stop push button has to be installed correctly with the correct color pattern on an external part of the test bench. According to “DIN EN ISO 13850: 2008” the emergency stop control must be red. If there is a background behind the control element, it shall be yellow. The emergency stop function must be available and functional at all times and it shall be easy to operate. Additionally the emergency stop function must take priority over all other functions and operations in all operating modes of the test bench. Another safety arrangement in consequence of mechanical issues can be protective clothing. Protective gloves and safety shoes should always be worn during installation and maintenance of the test bench. These protect people against body pinches or injuries. Another safety arrangement in consequence of mechanical issues is the hood on top of the test bench, which has to be closed before starting the movement of the linear motors. If necessary, this could be included to the PLC software as a security check with the help of a security switch.

Safety arrangement in consequence of electromagnetic issues (magnet)

Space distribution of visible danger signs that indicate the strong magnets of the secondary part of the linear motors. Watches and electronic data carriers that are sensitive to the magnet should not approach the secondary parts. The use of danger signs can avoid accidents and destruction for people and items. Another risk are people with cardiac simulator. They should be in safe distance from the test bench during operation. Additionally for safety reasons, they should not have handling about the test bench. Furthermore, people are not allowed to carry heavy or large items of iron or steel in their bare-hands in striking distance to the permanent magnets of the linear motors. For a possible accident, two fixed wedges made of non-magnetic material and a non-magnetic hammer should be available. This is necessary for the separation of the attracted magnetic parts and possibly quick release of fingers and hands. This serves primarily as a safety arrangement for electromagnetic problems.

Safety arrangement in consequence of electrical issues

Qualified personnel should only carry out installation and maintenance of the test bench. Additionally after switching off- or disconnecting the power supply, the personnel has to wait up to five minutes with the maintenance work because of the capacitor inside the frequency converter. The voltage at the DC link terminal points has to be measured. The device is safe once the voltage has fallen below 50 V. This serves primarily as a safety arrangement for electrical problems like an electrocution.

Safety arrangement in consequence of temperature issues

Heated components can be the cause of temperature issues and, in the worst case, lead to body burns. However, since the risk is low in the selected linear motors due to the relatively low technical characteristics currently no safety arrangement is necessary. Because of that the temperature behavior should be observed during operation and in case of doubt, retrofit a cooling system (e.g. a fan).

CE certification

EC - Declaration of Conformity

In the context of the EC-machinery directive 2006/42/EC.

Manufacturer:
Forschungszentrum Jülich GmbH
Wilhelm-Johnen-Straße
JCNS – Jülich Centre for Neutron Science
52425 Jülich
Germany

Named person for the management of the technical documentation:
N.N , Forschungszentrum Jülich GmbH,

Description and identification of the machine:

Identification/ product:
Type:
Serial number:
Year of manufacture:

We declare that the Test Bench complies with the
Machinery Directive 2006/42/EC and the
Pressure Equipment Directive 97/23/EC.

The protection target from the directive of the Electromagnetic Compatibility 2004/108/EC, were complied with in this portable test bench by the use of compliant components and assembly in accordance with DIN EN ISO 60204-1: 2006.

The protection objectives of the Low Voltage Directive 2006/95 / EC have been complied with in accordance with Attachment I, No. 1.5.1 of the Machinery Directive 2006/42 / EC.

The following harmonized standards have been applied:

DIN EN ISO 60204-1: 2006:	**Electrical equipment of machines** **Part 1: General requirement**s
DIN EN ISO 14121-1	**Safety of machinery - risk assessment** **Part 1: Principles**
DIN EN ISO 12100-1	**Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology**
DIN EN ISO 12100-2	**Safety of machinery - Basic concepts, general principles of design - Part 2: Technical principles and specifiactions**

Jülich, ...

Place, Date Signature

Prof. …
Director ….

Signature card for the CE declaration of confimity

By signing the responsibility and the complete processing of the task or area of responsibility for the

Machine:

Type: Year of manufacture:

Serial number: confirmed.

Area of responsibility	Necessary **(Yes/ No)**	**Name**	**Function**	**Date**	**Signature**
Selection of the applicable guidelines					

Hazard assessment (assessment of risk/ safety concept), Standards selection and conformity					
For the subarea electrical engineering					
For the subarea hydraulic system					
For the subarea pneumatic					
For the subarea control system					
For the subarea mechanical construction					
For the subarea mechanical production					

Creation of the documentation					
Involve a noticed area (Attachment IV MRL; DGRL etc.)					
Monitoring and factual review of the procedure by the responsible coordinator in the OU (Organization unit) (Documentation of project responsibility)					
Monitoring and formal review oft he procedure by the responsible supervisor of the coordinator in the OU (Documentation of line responsibility)					

If necessary, it is possible to extend the table.

Acceptance protocol for the user

For the use of technical equipment

Manufacturer: Forschungszentrum Jülich GmbH,

Type:

Serial number:

Year of manufacture:

According to BetrSichV (Ordinance on industrial safety and health), it is necessary, that among other things the following items are marked with “Yes” or “Not applicable” and additionally a user is appointed. Please carry out necessary additions.

	Yes|	No|	Not app.
• Created risk assessment, which evaluate the remaining risk from the risk analysis and the risks of usage and handle the necessary safeguarding	☐	☐	
• Manual of instruction	☐	☐	
• Operating instruction	☐	☐	
• Briefing (documented in writing, before starting practice, at least once a year)	☐	☐	
• Type plate with the necessary information mounted	☐	☐	☐
• Necessary initial assessment tests carried out			
○ Electrical system	☐	☐	☐
○ Pressure	☐	☐	☐
○ Ex-protection	☐	☐	☐
○	☐	☐	☐
○	☐	☐	☐
• Reccuring inspection periods fixend in writing	☐	☐	☐
• Necessary competent person appointed in written form	☐	☐	☐
○ Name:.....Qualification:.....			
○ Name:.....Qualification:.....			
○ Name:.....Qualification:.....			
• Created ex-protection document and with signature it comes into effect	☐	☐	☐
•	☐	☐	☐
•	☐	☐	☐

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User (Date, Name, Signature oft he operator)

Handover certificate from the manufacturer for the user

The technical equipment:

Manufacturer: Forschungszentrum Jülich GmbH,

Institution/area of operations:

Type:

Serial number:

Year of manufacture:

Was handed over to:

The user: European Spallation Source ERIC,

The Institution/area of operation:

With all technical documents.

A briefing of the user by the manufacturer has taken place:	☐ Yes	☐ No	☐ Not applicable

The user hereby accepts responsibility for the use.

For the safe operation, furhter arrangements are required (risk analysis, operating instruction, briefing, installation checks if necessary, see also acceptance protocol for the user)

Jülich, ...

Place, Date	Signature Manufacturer	Signature User
	Prof. ….	Prof….
	Director …	Director …

Safety Inspection Report

Test Safety Reports

Maintenance Report