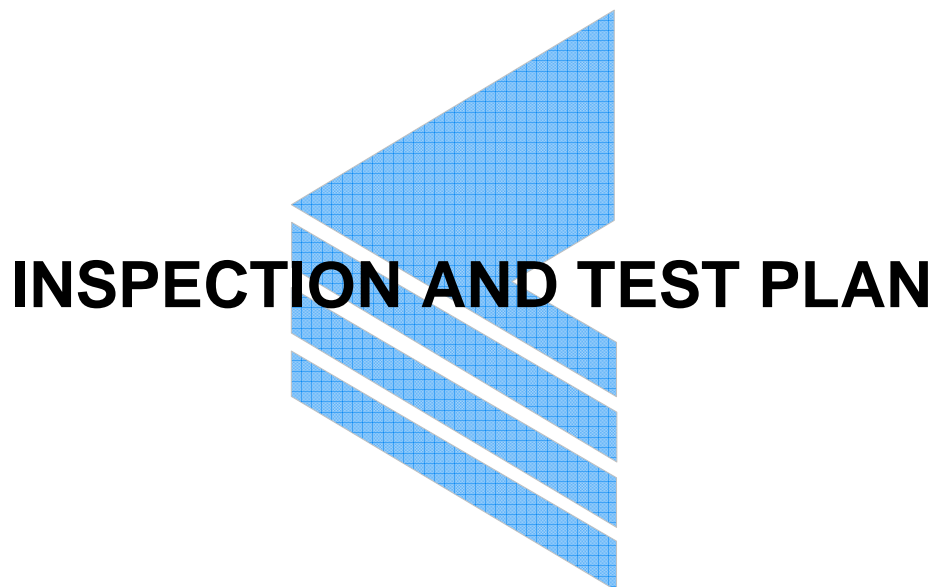
	INSPECTION AND TEST PLAN	Doc ref. : CIM-ITP-2017023 Rev. : 00 Date : 31/07/2017
---	---------------------------------	---



INSPECTION AND TEST PLAN

Project: **LBNF - TEST PIECES**

Client: **European Organization For Nuclear Research - CERN**

Trade Contractor: **Cimolai S.p.A.**

Project Ref.: **2017-023**

Revision matrix:

Rev.	Date	Issued	Checked	Approved
00	31/07/2017	Scaini S.	D'Anna E.	Punzo F.


	INSPECTION AND TEST PLAN	Doc ref. : CIM-ITP-2017023 Rev. : 00 Date : 31/07/2017
---	---------------------------------	---

TABLE OF CONTENT

0	DESCRIPTION OF REVISIONS	3
1	INTRODUCTION	3
1.1	Brief description of the structure.....	3
1.2	Scope of work.....	3
1.3	Fabrication sites.....	4
1.4	EN 1090 execution class of the structure.....	4
2	DEFINITIONS	4
3	ABBREVIATIONS	4
4	APPLICABLE CODES, STANDARDS AND SPECIFICATIONS	5
4.1	Norms & Standards.....	5
4.2	Contractor's documents.....	5
4.3	Cimolai's deliverables and (at their last applicable revision).....	5
4.4	Cimolai's internal management procedures (at their last applicable revision).....	5
5	MAIN PHASES OF INSPECTION AND TEST PLAN	5
5.1	Extent of Non Destructive Examination.....	6
5.2	Selection of areas to be subjected to examination.....	6

0 DESCRIPTION OF REVISIONS

Rev. 00 First issue.

1 INTRODUCTION

This document constitutes the Inspection and Test Plan for the steel elements named “LBNF Test Pieces”.

It concerns the activities carried out in the Cimolai workshops, and defines the inspection plan that guarantee compliance with contractual requirements.

1.1 Brief description of the structure

The “LBNF”, the “Long Baseline Neutrino Facility”, is the facility required for the Deep Underground Neutrino Experiment (DUNE), hosted at Fermilab in Batavia, Illinois. The DUNE is a dual-site experiment for neutrino science and proton decay studies.

Once it is completed, the LBNF will comprise the world's highest-intensity neutrino beam, at Fermilab, and the infrastructure necessary to support massive, cryogenic *far detectors* installed deep underground at the Sanford Underground Research Facility (SURF), 1,300 km downstream, in Lead, South Dakota.

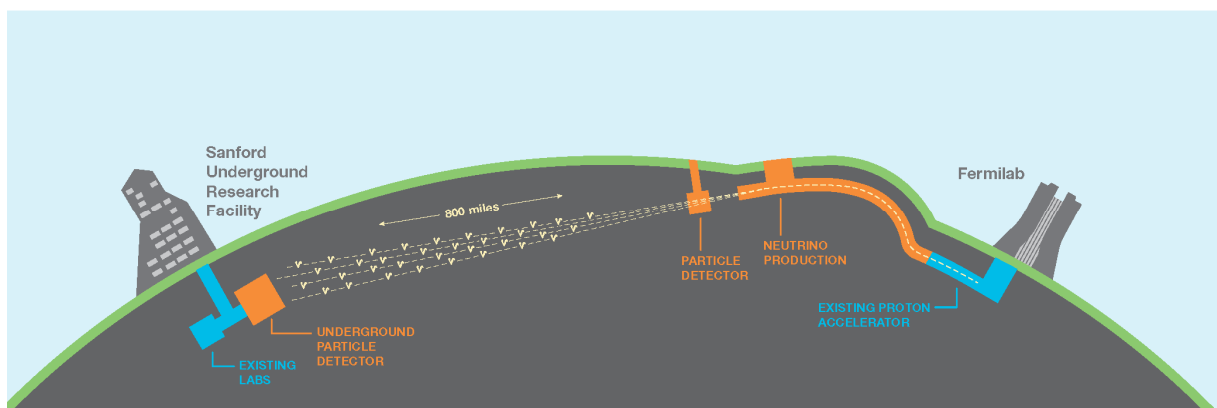


Figure 1 Schematics of “DUNE”

1.2 Scope of work


Cimolai has been awarded the contract for the supply and fabrication of steel test pieces for the LBNF.

The scope of work is summarised as follows:

1. issue of fabrication drawings,
2. fabrication of structural steelwork,
3. non-destructive testing in shop,
4. delivery ex-works.

Following activities are expressly excluded from the scope of works:

- i. material supplying,
- ii. surface treatment,
- iii. transport and erection,
- iv. third party inspection.

 Cimolai S.p.A.	<h1>INSPECTION AND TEST PLAN</h1>	Doc ref. : CIM-ITP-2017023 Rev. : 00 Date : 31/07/2017
--	-----------------------------------	---

1.3 Fabrication sites

The Contractor (CO) is Cimolai S.p.A. that will fabricate the steel structural components in one or more of its following fabrication sites:

- Polcenigo shop,
- Roveredo shop,
- Monfalcone shop,
- SanGiorgio di Nogaro shop.

1.4 EN 1090 execution class of the structure

The LBNF Test Pieces shall be fabricated according to Execution Class EXC 2 of Standard EN 1090-2 (Technical requirements for execution of steel structures).

2 DEFINITIONS

The Inspection and Test Plan (ITP) defines the check points, frequency of inspection, inspection method, acceptance criteria, people charged of the inspection, type of inspection, the documents associated with the inspection and the conditions to manage those documents. It contains all the information necessary to ensure quality control and prepare project execution monitoring documents, which meet the requirements.


Type of inspection	Description
H	Hold Point at which operation cannot progress until this activity is complete. Involved parties have to be notified of the time and location of inspection. Activity could not start without the presence of interested parties or their formal (written) refusal
W	Witnessed Point at which involved parties have to be notified of the time and location of inspection, but their absence is not an obstacle to starting and completion of the activity
S	Surveillance (Random Monitoring)
R	Review of Documentation
NA	Inspection Point not applicable

Witness and Hold points require the formal notification of the activity to the interested parts in due time to permit them to organize their presence. When resident inspectors are available at Cimolai's shops, the notification could be verbal or formalized by e-mail.

3 ABBREVIATIONS

The following is the meaning of the abbreviations used:

ITP	Inspection and Test Plan
CL	Client "CERN"
QA	Quality Assurance
QC	Quality Control
Rev	Revision
NDT	Non Destructive Test/Examination

	<h2>INSPECTION AND TEST PLAN</h2>	Doc ref. : CIM-ITP-2017023 Rev. : 00 Date : 31/07/2017
---	-----------------------------------	---

4 APPLICABLE CODES, STANDARDS AND SPECIFICATIONS

4.1 Norms & Standards

- [1] ISO 9001:2008 - Quality Management Systems – Requirement
- [2] EN 1090 - Execution of steel structures and aluminium structures

4.2 Contractor's documents

- [3] Set of Concept Drawings

4.3 Cimolai's deliverables and (at their last applicable revision)

- CIM-WB-2017023 - Welding Book

4.4 Cimolai's internal management procedures (at their last applicable revision)

- CIM-MGQ - Cimolai's Quality Management Manual.
- PRO-GDR - Procedure applicable to "Management of documents and records".
- PRO-PRD - Procedure applicable to "Production".
- PRO-MIS - Procedure applicable to "Test and measurement equipment".
- IOP-RDA - Procedure applicable to "Purchasing".
- IOP-CAM - Operative Instruction for "Material Receiving Inspection Procedure".
- IOP-MMA - Operative Instruction for "Marking of steel elements".
- IOP-NCP - Operative Instruction for "Management of non conformances".
- IOP-CVI - Operative Instruction for "Visual examination of Welds"
- IOP-CPM - Operative Instruction for "Magnetic particle examination"
- IOP-CUT - Operative Instruction for "Ultrasonic examination"

5 MAIN PHASES OF INSPECTION AND TEST PLAN

The Inspection and Test Plan (ITP) includes the following main sections, according to the sequence of manufacturing shop activities:

- 1 Availability of fabrication drawings
- 2 Availability of certifications and qualifications
- 3 Receiving of material
- 4 Cutting / drilling
- 5 Verification, storage and distribution of welding consumable
- 6 Check of welding activities
- 7 NDT inspection of welds
- 8 Weld repair (if any)
- 9 NDT inspection of weld repairs (if any)
- 10 Dimensional inspection of finished components
- 11 Inspection of material prior to shipment
- 12 Manufacturing Record Book

The Inspection and Test Plan table is given in attachment to this document.

5.1 Extent of Non Destructive Examination

The extent of Non Destructive Examination is based on the requirements of EN 1090-2, paragraph 12.4.

	VT EN ISO 17637	MT EN ISO 17638	UT EN ISO 17640 Technique A
<i>Fillet Welds (FW)</i>	100 %	5 %	/
<i>Partial Joint Penetration (PJP)</i>	100 %	10 %	/
<i>Complete Joint Penetration (CJP)</i>	100 %	10 %	10 %
<i>Technical Joints, if any (Complete Penetration Splice Joints) and Weld Repairs</i>	100 %	100 %	100 % (if CJP)
<i>Acceptance criteria</i>	EN ISO 5817 Level C	EN ISO 23278 Level 2X	EN ISO 11666 Level 3

5.2 Selection of areas to be subjected to examination

When the extent of examination is $<p>\%$ (less than 100%), the area of joints to be inspected shall be selected on the basis of Annex C of EN 12062, as per following table.

Length of joint	Selection of area to be inspected	Example $<p>\% = 20\%$
Length of welds ≥ 900 mm	Each weld shall be examined over a length of minimum $<p>\%$. The area to be examined shall include: <ul style="list-style-type: none"> • welds start and stops, • weld intersections • areas where weld aspect is irregular 	<i>Fillet weld, length 5000 mm</i> <i>Examine a length of (5000 x 20% =) 1000 mm</i>
Length of welds ^(Note 1) < 900 mm	A number $<p>\%$ of randomly selected welds shall be examined in their entire length.	<i>Nr. 16 fillet welds, each length 500 mm</i> <i>Examine the entire length of (16 x 20% = 3,2, to be round in excess) 4 welds</i>

Note 1: the welds shall have similar characteristics, e.g. fillet welds with same throat thickness and obtained by the same welding process.