

# SKILL TECHNICAL DESCRIPTION

## Building Information Modeling (BIM)

### 建筑信息模型技术描述

WorldSkills Russia "Young Professionals" Union (hereinafter referred to as WSR) in accordance with the charter of the organization and rules of the competition has established the following minimum professional skill command requirements for participation in the skill competitions. 俄罗斯世界技能（以下简称 WSR）按照组织章程和比赛规则建立了下面参与技能比赛的最低技能要求。

**The Technical Description consists of the following: 技术描述包含下面:**

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## 1. INTRODUCTION 介绍

### 1.1. PROFESSIONAL SKILL NAME AND DESCRIPTION 专业技能名称和描述

Skill name:技能名称

Building Information Modeling – BIM.建筑信息模型-BIM

#### 1.1.2 Skill description.技能描述

The BIM skill is actual for all architectural and constructional companies that perform project works. This skill is a natural evolution of an architect and design engineer of the construction industry with the purpose of the effectiveness and performance improvement, cost reduction, provision of the high quality of the project due to the end-to-end control of the building or facility life cycle at all its stages, from design to recovery. At the same time this skill forms an interdisciplinary approach to the task solving in the area of capital construction projects design. The BIM skill is intended to train students that are able to develop the Building Information Model, to form associated drawings on the basis of this model and to provide an adequate data exchange between participants of the informational and constructional activity.

**BIM** 技能适用于所有从事项目工作的建筑和建设公司，这项技能是建筑行业的建筑师和设计工程师为了提高效率和操作，降低成本，因建筑或者基础设施管理周期全阶段从头到尾的控制，从设计到复原，从而提供高质量的项目。同时，该技能形成了基本建设项目设计任务解决的跨学科方法。**BIM** 技能的目的在于培养学生能够开发建筑信息模型，在这个模型的基础上形成相关的图纸以及为信息和建筑活动的参与者之间提供足够的信息交换。

The skill competition presents a competitive work of design groups that study the technical specification. The development of a project includes the following stages: 这项技能比赛展示了研究技术规范的设计团队的工作，内容开发包含下面阶段：

- design solution acceptance;设计方案验收
- calculation of building's units and components; 建筑单元和模块的计算
- forecasting of the building's functional performance;建筑功能性能的预测
- development of the design and other documentation;设计和其他文档的开发
- making of cost estimations and construction plans.制定成本估算和建设计划

The skill competition is hold for 3 days. 技能竞赛将持续 3 天

It is a team skill and is intended to demonstrate both hard and soft skills. Architects and technical specialists, competent in the project management, information modeling, development of the design and estimate documentation, cooperate to create an effective and technological team that works in accordance with information modeling processes. The task of the team is the preparation of the information model of the capital construction project used at all stages of the facility's life cycle.

这是一个团队技能，目的在于展示硬技能和软技能。建筑师和技术专家将在项目管理，信息模型，设计和预算文件的开发，合作建立一支高效的和专业的按照信息模型程序工作的队伍等方面展开比拼。

Team members are encouraged to think beyond the frameworks of their own specialty in order to use joint efforts of the team in the best possible way. This competence has an outstanding meaning as an example of a modern production practice. 鼓励团队成员跳出自己专业的框架进行思考，以尽可能最好的方式利用团队的共同努力

## **1.2. THE RELEVANCE AND SIGNIFICANCE OF THIS DOCUMENT**

### **本文件的相关性和重要性**

This document contains information about the standards required to compete in the skill competition, the assessment principles, methods, and procedures that govern the competition. WSR hereby acknowledges the WorldSkills International (WSI)

copyright. Furthermore, WSR acknowledges WSI intellectual property rights regarding assessment principles, methods, and procedures.这个文件包含参与技能比赛所需的标准信息，评分原则，方法，以及管理比赛的流程。WRS 获得了世界技能国际的版权，还有，WRS 获得了 WSI 关于评分原则，方法以及流程的知识产权。

Every Expert and Competitor must know and understand this Technical Description.每一位专家和选手都必须明白和理解这份技术文件。

### **1.3. ASSOCIATED DOCUMENTS 相关文件**

Since this Technical Description contains only skill-specific information it must be used in association with the following documents:既然技术描述只包含专门技能信息，它必须和下面的文件伴随使用：

- WSR, Competition Standing Orders; 比赛议事规程
- WSR, online resources as indicated in this document;本文件中规定的在线资源
- WSR, policy and statutory regulations; 政策以及法定规则
- Skill-specific OHSE Instruction. 专门技能 OHSE 指导

## **2. WORLDSKILLS STANDARDS SPECIFICATION (WSSS)世界技能标准规范**

### **2.1. GENERAL NOTES ON THE WSSS WSSS 概论**

The WSSS specifies the knowledge, understanding, and specific skills that underpin international best practice in technical and vocational performance. It should reflect a shared global understanding of what the associated work role(s) or occupation(s) represent for industry and business.

WSSS 规定了在技术和职业表现方面支撑国际最佳实践的知识、理解和具

体技能，它应该反映代表工业和商业相关工作岗位或者职业的国际共识。

The skill competition is intended to reflect international best practice as described by the WSSS and to the extent that it is able to be implemented. The WSSS is, therefore, a guide to the required training and preparation for the skill competition.

技能比赛的目的在于反映 WSSS 描述的国际最佳案例并在一定程度上得到改进，因此，WSSS 是达到技能比赛所要求的培训和准备的指导

In the skill competition the assessment of knowledge and understanding will take place through the assessment of performance. There will not be separate tests of knowledge and understanding. 在技能比赛中，知识和理解的评分将会贯穿整个操作的评分，不会再单独安排知识和理解的考试。

The WSSS is divided into distinct sections with headings and reference numbers added. 用标题和添加的参考编号把 WSSS 分为不同的部分

Each section is assigned a percentage of the total marks to indicate its relative importance within the WSSS. The sum of all the percentage marks is 100. 每一部都被分配到总分的一个百分数来显示他在 WSSS 的重要性，所有百分比数值之和是 100

The Marking Scheme and the Test Project will assess only those skills that are set out in the WSSS. They will reflect the WSSS as comprehensively as possible within the constraints of the skill competition. 评分方案和比赛内容只会评估那些在 WSSS 中列明的技能，他们将会在技能比赛的限制内尽可能全面的反映 WSSS.

The Marking Scheme and the Test Project will follow the allocation of marks within the WSSS to the extent practically possible. A variation of 5% is allowed, provided that this does not distort the weightings assigned by the WSSS.

评分方案和比赛内容将会遵循 WSSS 分配的分值并尽可能反映实际，允许 5% 的偏差，只要这不会改变 WSSS 分配的权重。

The competition is held to demonstrate and evaluate the level of qualification in this skill. The Test Project only consists of practical tasks. The skill competition

presents a competitive work of design groups developing the Building Information Model in accordance with the technical specification. The task execution includes the following stages: 举办这个比赛是为了展示和评估这项技能的资格水平。比赛内容只包含实际任务，技能比赛展示的是设计团队按照技术规范开发建筑信息模型的竞赛工作，执行任务包含下面阶段：

- design solution acceptance; 设计方案验收
- calculation of building's units and components; 建筑单元和模块的计算
- forecasting of the building's functional performance; 建筑功能性能的预测
- development of the design and other documentation; 设计和其它文档的开发
- making of cost estimations and construction plans. 成本预算和建设规划的制定

的制定

Section	
<b>1</b>	<b>Building Information Model 建筑信息模型</b>
<b>40%</b>	<p>A specialist shall know and understand: 专业人员应该知道和理解:</p> <ul style="list-style-type: none"> <li>• be able to understand the technical specification and form a design solution in accordance with this specification; 能够理解技术规范并按照这个规范形成设计方案</li> <li>• determine in accordance with the technical specification 按照技术规范作出决定</li> <li>• development of the object's SD-model in the information modeling environment; 在信息模型环境中物体 SD 模型的开发</li> <li>• filling of the Building Information Model elements with necessary accessories and data; 用必要的辅助和数据填充建筑信息模型元素</li> <li>• understanding of the IFC universal open format and skill to perform export and import; IFC 理解通用开口模式和技能来执行出口和进口</li> <li>• formation of related (associated) drawings on the basis of the information model; 在信息模型的基础上相关图纸</li> </ul>



	<p>的形成</p> <ul style="list-style-type: none"> <li>• knowledge of the level of detalization of the information model (LOD); LOD 知识</li> <li>• methods for the assessment and interpretation of collisions on the basis of the information model;在信息模型的基础上评估方法和碰撞解释</li> <li>• formation of the set of the documentation package in accordance with RF legal and engineering acts (RF Government Regulation dd. 16.02.2008 No. 87 (revised 21.04.2018) Concerning Composition of Authority Engineering Documentation Sections and Requirements to Their Contents and order of the Ministry of Construction No.783/pr).按照 RF 法律和工程规范一些列文档的形成。</li> </ul>	
	<p>A specialist shall be able to:专业人员应该能够:</p> <ul style="list-style-type: none"> <li>• adequately execute drawings in accordance with GOST;按照 GOST 恰当的执行图纸</li> <li>• develop the building's SD-information model;开发建筑 SD 信息模型</li> <li>• work with object-oriented appendices for corresponding sections;使用目标驱动测试用于相应的部分</li> <li>• work with the open general IFC format; 使用开放的通用 IFC 模式</li> <li>• determine collisions in the SD-model;确定 SD 模型中的冲突</li> <li>• work with initial files and electronic documents;使用初始文件和电子文件</li> <li>• form the documentation package in accordance with legal and engineering acts.按照法规和工程实践形成文件包</li> </ul>	
<b>2</b>	<b>Planning 规划</b>	<b>10%</b>
	<p>A specialist shall know and understand: 专业人员应该能够知道和理解</p> <ul style="list-style-type: none"> <li>• Construction and building planning principles; 施工和建筑规划原则</li> <li>• Calendar and resource planning; 进度表和资源规划</li> <li>• Organization of the collective work on the project. 项目组织工作</li> </ul>	

	<p>A specialist shall be able to: 专业人员应该能够</p> <ul style="list-style-type: none"> <li>• prepare the Work Breakdown Structure (WBS); 准备工作分解表</li> <li>• planning of the resource loading. 资源规划</li> </ul>	
<b>3</b>	<b>Cost estimates 费用预算</b>	<b>15%</b>
	<p>A specialist shall know and understand: 专业人员应该知道和理解</p> <ul style="list-style-type: none"> <li>• types of cost estimates;费用预算的类型</li> <li>• main methods for the calculation of cost estimates;费用预算的计算的主要方法</li> <li>• project's cost estimate; 项目的费用预算</li> <li>• SNIps and also regulations in the field of urban construction, industry-specific regulatory and guidance documents in the field of pricing and cost estimates;</li> <li>• basics of architectural and process designing; 建筑和流程设计的基础</li> </ul>	
	<p>A specialist shall be able to:专业人员能够</p> <ul style="list-style-type: none"> <li>• determine financial and labour costs;确定财务和劳动力成本</li> <li>• obtain information for the cost estimate from the BIM model;从 BIM 模型中获得费用预算所需的信息</li> <li>• automate calculation methods; 自动化计算方法</li> <li>• form and maintain the archive of the cost estimate documentation.形成和保存费用预算文档的档案文件</li> </ul>	
<b>4</b>	<b>Project management 项目管理</b>	<b>20%</b>
	<p>A specialist shall know and understand:专业人员应该知道和理解:</p> <ul style="list-style-type: none"> <li>• management of the project portfolio;项目组合管理</li> <li>• project design documentation approval process; 项目设计文档审批程序</li> <li>• formation and maintenance of the electronic DED archive.电子 DED 档案的排列和管理</li> <li>• formation of the documentation package in accordance with the order of ministry of construction No.783/pr.按照建设部 No.783 号文件形成档案包</li> </ul>	
	<p>A specialist shall be able to:专业人员应该能够:</p> <ul style="list-style-type: none"> <li>• organization of the collective work on the project;项目集体工作的组织</li> </ul>	

	<ul style="list-style-type: none"> <li>operative planning of works on the project (correction of the critical path);项目的操作规划（关键节点的指正）</li> <li>execution of the documentation approval and revision process; 文件的审批和指正</li> <li>comparison of document versions 文件版本的比较</li> <li>keep the referential integrity of the project; 保持项目的参照完整性</li> <li>organize the work with sub-contractors within the existing BIM project; 在现有 BIM 项目中组织与分包商的工作</li> <li>form and maintain the electronic DED archive.形成和保管电子 DED 文档</li> </ul>	
<b>5</b>	<b>Work execution 工作执行</b>	<b>15%</b>
	<p>A specialist shall know and understand:专业人员应该知道并了解:</p> <ul style="list-style-type: none"> <li>project management; 项目管理</li> <li>engineering data and information modeling management systems;工程数据和信息模型管理系统</li> <li>saving of information and intellectual property management;保存信息和知识产权管理</li> <li>safety. 安全性</li> </ul>	
	<p>A specialist shall be able to:专业人员应该能够:</p> <ul style="list-style-type: none"> <li>read and interpret the construction documentation and BIM models;读懂和翻译建筑文件和 BIM 模型</li> <li>use the engineering data management system; 使用工程数据管理系统</li> <li>describe and adjust processes of collective work on the project;描述和调整项目集体工作的程序</li> <li>perform the collection of the project documentation with use of engineering data management systems.使用工程数据管理系统收集项目文档</li> </ul>	
	<b>Communication and interpersonal skills 沟通与人际交往技能</b>	
	<p>A specialist shall know and understand: 专业人员应该知道和理解:</p> <ul style="list-style-type: none"> <li>spectrum and purposes of documentation in both paper and electronic forms;纸质和电子文档的范围和目的</li> <li>the technical language associated with the skill and</li> </ul>	

	<p>technology;和技能和技术相关的技术语言</p> <ul style="list-style-type: none"> <li>• the standards required for routine and exception reporting in oral, written, and electronic form; 口头、书面和电子形式的常规和异常报告所需的标准</li> <li>• the required standards for communicating with clients, team members and others; 和客户、团队成员和其他人沟通需要的标准</li> <li>• the purposes and techniques for maintaining and presenting reports, including financial reports. 修改和提交报告的目的和技巧, 包含财务报告。</li> </ul>	
	<p>A specialist shall be able to: 专业人员应该能够:</p> <ul style="list-style-type: none"> <li>• read, interpret, and extract necessary technical data and instructions from documentation in any available format; 从任何可用格式的文档中读取, 翻译, 和提炼必要的技术资料和指导。</li> <li>• communicate by oral, written and electronic means to ensure clarity, effectiveness, and efficiency; 通过口头, 书面或者电子方式沟通来确保透明, 效果和效率。</li> <li>• use a standard set of communication technologies; 使用标准的通讯技术</li> <li>• explain complex technical principles and applications to non-experts; 向非专家解释复杂技术原理和应用</li> <li>• complete reports and respond to issues and questions arising; 完善报告并回应产生的事宜和问题</li> <li>• respond to client's needs face to face and indirectly; 面对面和间接地回应客户的需要</li> <li>• Arrange to gather information and prepare documentation as required by the client. 按照客户要求安排收集信息和准备文档</li> </ul>	
<b>Total</b>		<b>100%</b>

## 2.2 Distribution of modules by competition days 按照比赛日期分配的模块

Day 天	Module 模块	Competition time 比赛时间
1-2	Planning 规划	2
1-2	Building Information Model 建筑信息模型	12
2-3	Cost estimates 费用预算	0

3	Project management 项目管理	2
3	Work execution 工作执行	2
	<b>Total 总计</b>	<b>18</b>

2.3 To perform the task, the team shall comprise 2 persons, specialists in the following professions with **mandatory** knowledge:

为了执行任务，团队有两人组成，具有下列专业知识的专家：

- BIM-manager; BIM 经理
- architect; 建筑师
- design engineer; 设计工程师
- estimating engineer. 预算工程师

It is supposed that participants will perform tasks related to their main profile and neighbour profile. For example, the participant No.1 performs the task block that is meant for a BIM manager and architect, the participant No.2 performs tasks that are meant for a design engineer and estimating engineer. 假设选手执行有关主要和次要的任务，选手 1 执行 BIM 经理和建筑师的任务，选手 2 执行设计工程师和预算工程师的任务。

Participation in the skill competition provides for the knowledge of programs:

参加技能竞赛提供了有关程序的知识

- BIM system, working with the IFC format; BIM 系统，用 IFC 模式
- management system for the design organization and processes of the information modeling (ECM);设计组织和信息模型处理的管理系统
- CAD systems for the issuance of the project design documentation;出具项目设计文档的 CAD 系统
- cost estimation programs.费用预算程序

## **2.2. THE WORLDSKILLS MULTI VENDOR STANDARDS WORLDSKILLS (WSSS)**

The purpose of WSSS is the improvement of the status and standards of the professional training and qualification, based on best international and national practices of technical and professional work execution level. For the best possible exchange of professional practices and correct adaptation to needs and requirements of the modern Russian industry, the Test Project shall not be related to a specific software manufacturer and shall be formulated in such a manner that it can be performed in modern BIM and ECM systems. WSSS 的目的是基于国际和国家技术实践以及专业操作水平来促使职业培训和认证的状况和标准的改进，为尽可能最好的专业实践交流和正确适应俄罗斯现代工业的需要和要求，比赛内容不能和特定的软件制造商相关，应按照现代 BIM 和 ECM 系统中执行的方式制定。

The main limitation for the development of the Building Information Model with help of BIM systems is saving and working with the universal IFC exchange format. 在 BIM 系统帮助下，建筑信息模型开发的主要限制是使用通用 IFC 交换模式保存和工作。

The participant has a right to select a convenient BIM system, providing the information on his choice to the Chief Expert by an electronic letter in advance. If the BIM system, selected by the competitor, cannot be provided due to technical conditions (there is no license for the use of BIM system at the site), the competitor has a right to select a similar system from the main list of frequently used BIM systems of the skill that are represented in the Infrastructure List.

选手有权选择一个方便的 BIM 系统，只需提前将它选择的信息通过邮件呢发给首席专家。如果选手选择的 BIM 系统，由于技术原因无法提供（现场没有获得 BIM 系统使用许可）选手可以有权从技能硬件列表中注明的频繁使用的 BIM 系统主要列表选择一个相似的系统。

### **3. ASSESSMENT STRATEGY AND TECHNICAL FEATURES**

## 评分策略和技术要点

The Strategy establishes the principles and techniques to which WSR assessment and marking must conform. 策略确立了俄罗斯技能组织评估和评分必须遵循的原则和技巧。

Expert assessment practice lies at the heart of WSR competitions. For this reason, it is the subject of continuous professional development and scrutiny. The growth of expertise in assessment will inform the future use and direction of the main assessment instruments used by WSR competitions: the Marking Scheme, Test Project, and Competition Information System (CIS). 专家评分是俄罗斯世界技能比赛的核心。为此，它是持续专业开发和审查的主题。评估专业知识的增长将为 WSR 竞赛使用的主要评估工具的未来使用和方向提供信息：评估方案，比赛内容和比赛信息系统。

Assessment at WSR competitions falls into two broad types: measurements and judgment. For both types of assessment, the use of explicit benchmarks against which to assess each aspect is essential to guarantee quality. 世界技能比赛的评分分为两种：测量和裁判，对于两种评分，使用明确的基准来评估每个得分点对于保证质量是至关重要的。

The Marking Scheme must follow the weightings within the WSSS. The Test Project is the assessment vehicle for the skill competition and should also follow the WSSS. The Competition Information System (CIS) enables the timely and accurate recording of marks, which contributes to the proper organization of the competition. 评分方案必须遵循 WSSS 内的权重，对于技能比赛，比赛内容就是评分工具需要遵循 WSSS. 比赛信息系统能够及时和准确的记录分值，有助于比赛的合理组织。

The Marking Scheme, in outline, will lead the process of Test Project design. After this, the Marking Scheme and Test Project will be designed and developed

through an iterative process, to ensure that both together optimize their relationship with the WSSS and the Assessment Strategy. They will be submitted to the Skill Competition Manager for approval together, in order to demonstrate their quality and conformity with the WSSS.

## 4. MARKING SCHEME 评分方案

### 4.1. GENERAL GUIDANCE 总则

This section describes the role and place of the Marking Scheme, how the Experts will assess the competitor's work demonstrated through the Test Project performance, and the procedures and requirements for marking. 这段描述了评分方案的角色和地位，专家是如何通过比赛操作来对选手展示的操作进行评分以及评分的程序和要求。

The Marking Scheme is the pivotal instrument of WSR competitions and determines the compliance of the Test Project assessment with the WSSS. It is designed to allocate marks for each assessed aspect of performance, which refers to just one WSSS module. 评分方案是 WSR 竞赛的关键工具，它决定了测试项目评估与 WSSS 的符合性，给每一个需要评分的得分点分配分值，只给一个 WSSS 模块。

By reflecting the weightings specified in the WSSS, the Marking Scheme establishes the parameters for the design of the Test Project. Depending on the nature of the skill and its assessment needs, it may initially be appropriate to develop the Marking Scheme in more detail as a guide for Test Project design. Alternatively, the Test Project design can be based on the outline Marking Scheme. From this point onwards, the Marking Scheme and Test Project should be developed together.

通过反映 WSSS 注明的权重，评分方案确立了比赛内容设计的参数，按照技能的性质和评分需要，作为比赛内容设计的指导，最初可以更详细地制定



评分方案。或者，比赛内容的设计可以基于评分方案的大纲。从这点可以看出，评分方案和比赛内容应该一起开发。

Section 2.1 indicates the extent to which the Marking Scheme and Test Project may diverge from the weightings given in the Standards Specification.

2.1 部分显示了评分方案和比赛内容偏离标准规范中注明的权重的幅度。

The Marking Scheme and the Test Project may be developed by one person, or a group of experts, or a third-party developer. The detailed and final Marking Scheme and Test Project must be approved by the Skill Competition Manager. 评分方案和比赛内容可以由一个人开发，也可以由一组专家或者第三方开发者开发。详细的和最终的评分方案和比赛内容必须得到技能比赛经理批准。

Furthermore, all experts are encouraged to submit their proposals for the development of Marking Schemes and Test Projects to the Discussion Forum for further review by the Skill Competition Manager. 另外，鼓励所有的专家将评分方案和比赛内容开发建议提交到讨论区以便技能比赛经理进一步复审。

In all cases a complete Marking scheme approved by the Skill Competition Manager must be entered into the CIS at least two days prior to the competition using the CIS standard spreadsheet or other agreed methods. The Chief Expert is responsible for this process. 任何情况下，经过技能比赛经理批准的完整的评分方案必须在比赛前两天使用 CIS 标准模板或者其他同意的方式录入 CIS 系统。首席专家负责此事。

#### **4.2. ASSESSMENT CRITERIA 评分标准**

The main headings of the Marking Scheme are the assessment criteria. In some skill competitions, the assessment criteria may be similar to the section headings in the WSSS; in others, they may be totally different. There will normally be between five and nine assessment criteria; that said, there should be at least three assessment criteria. Whether or not they match the headings, the Marking Scheme must reflect

the weightings specified in the WSSS. 评分方案的主要内容就是评分标准，在一些技能比赛中，评分标准可能和 WSSS 中段落标题相似，另一种情况，他们可能完全不同。正常情况下，评分标准数量介于 5 到 9 之间，也就是说，至少有 3 个评分标准，无论他们是否和标题匹配，评分方案必须反映 WSSS 注明的权重。

Assessment Criteria are created by the person(s) developing the Marking Scheme, who are free to define the criteria they consider most suited to the assessment and marking of the Test Project. 评分标准是由开发评分方案人员开发，他们可以自由定义他们认为最适合比赛内容评价和打分的标准。

The Mark Summary Form generated by the CIS will comprise a list of the assessment criteria. 由 CIS 生成的分值摘要表由评分标准列表组成。

The marks allocated to each criterion will be calculated by the CIS. This will be the cumulative sum of marks given to each aspect within that assessment criterion.

分配给每一项的分值将由 CIS 计算。这将在评分标准内每个得分点所得分值的累计总和。

### **4.3. SUB CRITERIA 子标准**

Each assessment criterion is divided into one or more sub criteria. Each sub criterion becomes the heading for a Marking Scheme. 每一个评分标准分为一个或者多个子标准，每一个子标准成为评分方案的标题。

Each marking form (sub criterion) specifies a certain date on which it will be filled. 每一个评分表规定了需要填写的固定日期

Each marking form (sub criterion) contains the aspects to be assessed. Each marking method is assigned to a special marking form. 每一个评分表包含需要评分的得分点，每一个评分方法对应一个特殊的评分表。

### **4.4. ASPECTS 得分点**

Each Aspect defines, in detail, a single item to be assessed and marked together with the marks or instructions for how the marks are to be awarded. 每一个得分点详细注明，某一个需要评分和打分的得分点以及得分的备注或者指导。

The marking form lists, in detail, every aspect to be marked together with the mark allocated to it. 得分表详细列明每一个得分点以及对应的分值。

The sum of the marks allocated to each aspect must fall within the range of marks specified for that section of the skill in the WSSS. It will be displayed in the Mark Allocation Table of the CIS in the following format: 每一个得分点的分值总和必须在 WSSS 技能部分规定的分值范围内，将会按照下面模板显示在 CIS 的分值飞陪表中。

TP modules 比赛内容模块							Total points per WSSS section 每部分总分	WSSS POINTS PER SECTION
WorldSkills Standard Specification (WSSS) Sections 世界技能标准规范		A	B	C	D	E		
	1	10	1	1	20	1	33	
	2		24				24	
	3		15				15	
	4			19			19	
	5					9	9	
Total marks per criterion 每个标准的总分		10	40	20	20	10	100	

#### 4.5. JURY'S OPINION (JUDGMENT MARKING) 裁判委员会意见（主观评分）

For making decisions the 0–3 scale, except for specific points, related to the information modeling, is used. To apply the scale with rigour and consistency, judgement must be conducted using: 对于给出 0-3 分，除了与信息模型相关的具体的分数，是可以的。为了保持严格和一致性，判分必须使用：

- Benchmarks (criteria) for detailed guidance for each aspect 每个得分点的项目指导标准
- 0–3 scale, where: 0-3 分
  - 0: performance below industry standard; 操作未达到工业标准
  - 1: performance meets industry standard; 操作满足工业标准
  - 2: performance meets and, in specific respects, exceeds industry standard;操作满足，在某些具体方面高于工业标准
  - 3 and higher: performance wholly exceeds industry standard and is judged as excellent. 操作整体高于工业标准并被评定为优秀。

Three experts will judge each aspect, each expert must perform assessment, after which the allotted marks will be compared. If the expert assessments vary by more than 1 point, they must discuss the assessment of this particular aspect and eliminate the difference. 3 名专家对每个得分点进行打分，每一名专家都必须评分，之后将进行比较 3 位的评分，如果专家的评分差额高于 1 分，他们必须讨论某一个得分点并消除差额。

#### **4.6. ASSESSMENT USING MEASUREMENT 用测量评分**

Three experts will be used to assess each aspect. Unless otherwise stated only the maximum mark or zero will be awarded. If within some aspect it is possible to award marks below the maximum, it shall be described in the Marking Scheme with the measurable parameters specified. 用三个专家对每个得分点进行打分。除非另有规定只给最高分或者零分。如果在一些得分点内可以给低于最高分，应该使用规定的可测参数在评分方案中注明。

#### **4.7. THE USE OF MEASUREMENT AND JUDGMENT 测量和裁判的使用**

Decisions regarding the selection of criteria and assessment methods will be made during the design of the competition through the Marking Scheme and Test

Project. The table provided contains approximate information and is intended for the development of the Marking Scheme and the Test Project. 将在比赛设计过程中通过评分方案和比赛内容作出关于标准和评分方法选择的决定。

Test Project Modules 比赛内容模块		Points 分值	
		Jury's opinion	Measurable
A	Planning 规划		10
B	Building Information Model 建筑信息模型	5	35
C	Cost estimates 费用预算	3	17
D	Project management 项目管理	5	15
E	Work execution 执行		10
Total			100

#### 4.8. SKILL ASSESSMENT SPECIFICATION 技能评分规范

The Test Project assessment will be based on the following criteria (modules): 比赛内容评分将会按照下面标准:

	Criterion name 标准名字	Description 描述	Verification procedure 核查程序
1	Data transfer and management organization 数据转移和管理组织	1) project work breakdown; 项目分解 2) resource planning; 资源规划 3) assignment of project's access rights. 项目使用权分配 4) formation of the project structure; 项目结构的形成 6) work with specialists in neighbour profiles; 在次要文件上和专业人士合作 7) presence of the design and estimate documentation archive. 设	Is based on standards, accepted in the industry. 基于标准, 被行业内接受

		计展示和评估文档	
2	<b>Completeness and quality of the 3D BIM-model</b> 3D BIM 模型的完整性和质量	<p>1) studying of the technical specification;研究技术文档</p> <p>2) physical modeling (work with the IFC format); 物理建模（在IFC模式下）</p> <p>3) presence of collisions in the BIM-model;在BIM模型下显示碰撞</p> <p>4) heating, ventilation, water and sewerage designing. 热力，通风和下水道设计。</p>	Is based on judgements of Experts and technical consultants (industry-specific independent experts) and also on standards, accepted in the industry. 基于专家判断和技术咨询（特定行业独立专家）以及标准，行业接受。
3	<b>Drawing up of work scope data sheets and specifications. Issuance of drawings and specifications</b> 拟定工作范围数据表和规范。发布图纸和规范	<p>1) formation of specifications;规范的形成</p> <p>2) drawing up of the project design documentation (including plans, faces, construction sections); 起草项目设计文档（包含规划，要点，施工部分）</p> <p>3) electronic structure of the project. 项目的电子版</p>	Is based on judgements of Experts and technical consultants (industry-specific independent experts) and also on standards, accepted in the industry. 基于专家判断和技术咨询（特定行业独立专家）以及标准，行业接受
4	<b>Cost estimates</b> 费用预算	<p>1) execution of cost estimates;费用预算的执行</p> <p>2) electronic structure of the project. 项目的电子版</p>	Based on Experts' judgements and also on standards, accepted in the industry. 基于专家判断和标准，行业内接受
5	<b>Work execution</b> 执行	1) formation of the project for export;形成出口项目	Is based on standards,

	2) reports on the dynamics of works on the project development; 项目开发工作的动态报告 3) individual reports on each participant. 每一位参与者的个人报告	accepted in the industry. 基于标准，行业内接受。
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#### 4.9. ASSESSMENT STANDING ORDERS 评分程序

The Chief Expert and Deputy Chief Expert shall discuss and divide the experts into groups (each group is composed of at least three people) for marking. Each group shall include at least one experienced expert. An expert shall not assess any competitor from their own organization. 首席专家和副首席专家将讨论并把专家分组（每组至少三人）进行评分。每组至少包含一名有经验的专家。一名专家不能对自己组织的任何选手进行评分。

The competitor's general standing will be determined by the sum of points awarded to the competitor over all competition days for all assessable criteria. 选手的总体排名将由按照评分标准在全部比赛期间的所有得分决定。

## 5. TEST PROJECT 比赛内容

### 5.1. MAIN REQUIREMENTS 主要要求

Sections 2, 3, and 4 govern the development of the Test Project (TP). The recommendations in this section provide additional explanation for the TP content. 2, 3,4 部分规定了比赛内容的开发。本节的建议为比赛内容提供了额外的解释。

The Test Project performance shall take not less than 15 and no more than 22 hours. 比赛内容的操作不少于 15 小时并且不超过 22 小时。

Competitors must be between the ages of 14 and 25 years old to perform this Test Project. 参与比赛的选手年龄需要介于 14 到 25 岁之间。

Regardless of the number of modules, the TP shall enable the assessment of the

skills in each section of the WSSS.无论模块多少，TP 应使 WSSS 的每个部分的技能评估成为可能。

The Test Project not cover areas outside the WSSS. The participant's knowledge shall be assessed and marked exclusively in the practical performance of the Test Project.比赛内容不会包含 WSSS 之外的领域，参与者的知识在比赛内容的实际操作中能够得到评估和单独打分。

The Test Project will not assess knowledge of WSR rules and regulations.比赛内容不会对世界技能规则 and 规定进行评分。

## **5.2. TEST PROJECT STRUCTURE 比赛内容构成:**

The Test Project includes 5 modules:

- Planning;
- Building Information Modeling;
- Cost estimates;
- Project management;
- Work execution.

## **5.3. TEST PROJECT DESIGN REQUIREMENTS 比赛内容设计要求**

### **General requirements: 总体要求**

The Test Project must:比赛内容必须:

- provide for the development and management of the project at all stages of the product lifecycle; 在产品生命周期的全阶段提供项目的开发和管理
- be performable; 可执行的
- be significant for the development of the Russian industrial and civil construction and building technology; 对于俄罗斯的发展和国内施工和建筑技术发展有意义的。
- be complete and without contradictions; 完整的并没有矛盾的
- shall be feasible in minimum two alternative versions of software, depending



on solved tasks within the Test Project.至少两种软件是可行的，取决于比赛内容中医解决的任务。

The Test Project shall comprise the following modules: 比赛内容应由下面模块组成:

### **1. Planning 规划**

Execute the calendar and resource planning on the basis of initial project data. Organize the collective work on the project.基于最初的项目数据制定工期表和资源规划。组织项目的集体工作。

### **2. Building Information Modeling 建筑信息模型**

Development of the Building Information Model (BIM model): architectural section (AS/AR), structural element (KZh), Detalization level — LOD 300. Collision determination in 3D-models. Drawing up of the design and estimation documentation in accordance with GOST. Operational format of the Building Information Model — IFC.建筑信息模型的开发：建筑剖面图，构件，详细水平—LOD 300.3D 模型中的碰撞决定。按照 GOST 起草设计和预算文档。建筑信息模型的操作模式—IFC.

### **3. Cost estimates 费用预算**

Determine the financial and labour costs on the basis of information, obtained from the BIM model.基于从 BIM 模型中获得信息确定财务和劳动力成本。

### **4. Project management 项目管理**

Agree the design and estimate documentation. Form the documentation package in accordance with the Russian normative and technical base. Make an electronic archive of the DED.设计和预算文档同意后，按照俄罗斯文档和技术资料形成文件包，制作 DED 电子包。

## 5. Work execution 项目执行

Perform the collection of the project documentation with use of engineering data management systems. 使用工程数据管理系统收集项目文档

The Test Project shall be so formulated that it can be performed in main modern BIM systems. The Building Information Model shall be kept in the universal IFC exchange format. 比赛内容应表述出来以便可以在主要的现代化的 BIM 系统中操作，BIM 模型应该保存在通用 IFC 交换模式中。

### **Competition workshop requirements: 比赛工位要求:**

Competition workshop requirements are indicated in the Infrastructure List. 工位要求在硬件列表中显示

### **Competitor's workstation arrangement: 选手工位安排:**

The workstation layout is provided for reference only. 工位布局仅供参考。

## **5.4. TEST PROJECT DEVELOPMENT 比赛内容开发**

The Test Project must be developed using the templates provided by the Skill Competition Manager on the WSR forum (<http://forum.worldskills.ru>). The Test Project samples provided shall be changed once a year.

### **5.4.1. WHO DEVELOPS THE TEST PROJECT/MODULES 谁来开发比赛内容/模块**

The Skill Competition Manager is responsible for the overall management and approval of the Test Project. The following individuals may be involved in the Test Project development:

- Certified WSR experts;
- Third-party design engineers;
- Other concerned parties.

If 30% changes are made to the Test Project, the following individuals shall participate in the preparation process for each competition:

- Chief Expert;
- Certified Skill Expert (if present at the competition);
- Experts taking part in assessment (if required to be involved by the Chief Expert).

The introduced 30% changes to the Test Project must be approved by the Skill Competition Manager.

When 30% changes are made to the Test Project, the above-mentioned persons shall be guided by the principles of objectivity and impartiality. The changes shall not affect the complexity of the Test Project or relate to other professional areas not described in the WSSS or exclude any WSSS units. Furthermore, the changes introduced shall be performable using the approved Infrastructure List for the competition.

### 5.4.2. HOW THE TEST PROJECT IS DEVELOPED 比赛内容是如何开发的

Test Projects for each competition shall be developed based on the unified Test Project approved by the Skill Competition Manager and posted on the Discussion Forum. Test Projects can be developed both as a whole or in modules. The Discussion Forum is the main tool for developing the Test Project.

### 5.4.3. WHEN THE TEST PROJECT IS DEVELOPED 比赛内容是何时开发出来的

The Test Project is developed according to the following timeline that defines the documentation preparation periods for each competition type.

Time frames	Local competition	Qualifying competition	National competition
Test Project template	The Test Project from the previous National Competition shall be taken from the Discussion Forum in unmodified form	The Test Project from the previous National Competition shall be taken from the Discussion Forum in unmodified form	The Test Project shall be developed based on the previous competition taking into account the skill competition experience and the industry standards 6 months prior to the competition
Approval of the Chief Competition Expert responsible for TP development	2 months prior to the competition	3 months prior to the competition	4 months prior to the competition
TP publication (if applicable)	1 month prior to the competition	1 month prior to the competition	1 month prior to the competition

Introduction of 30% changes made to the TP and approval by the Skill Competition Manager	On Day C-2	On Day C-2	On Day C-2
Submission of proposals on the Discussion Forum regarding the modification of TP, AC, IL, TD, EN, GR	On Day C+1	On Day C+1	On Day C+1

### 5.5. TEST PROJECT APPROVAL 比赛内容批准

The Chief Expert and the Skill Competition Manager shall decide whether all modules can be performed and, if necessary, prove their feasibility. Time and materials shall be taken into consideration.

The Test Project can be approved in any form convenient for the Skill Competition Manager.

## 6. SKILL MANAGEMENT AND COMMUNICATION 技能管理和沟通

### 6.1. DISCUSSION FORUM 讨论区

Prior to the competition, all discussions must take place on the skill specific Discussion Forum (<http://forum.worldskills.ru>). Skill related decisions shall only be made after a preliminary discussion on the forum. In addition, information on all important skill related events shall be provided on the forum. This forum is moderated by an International Expert and/or a Skill Competition Manager (or an

Expert nominated by them).

## **6.2. INFORMATION FOR COMPETITORS 选手所用信息**

The information for competitors is published in accordance with the Standing Orders for the competition. Information may include: 选手所用信息按照比赛规定进行公布，信息包含：

- Technical Description; 技术描述
- Test Projects; 比赛内容
- Mark Summary Form; 评分摘要表
- Infrastructure List; 硬件清单
- Occupational Health and Safety instructions; 职业健康和安全指导
- Additional information 额外信息

## **6.3. ARCHIVE OF TEST PROJECTS 比赛内容文件**

The Test Projects are available at <http://forum.worldskills.ru>. 比赛内容可以从 <http://forum.worldskills.ru> 获得。

## **6.4. SKILL MANAGEMENT 技能管理**

General skill management shall be carried out by the International Expert and the Skill Competition Manager with the potential involvement of the expert community.

Skill management within a specific competition shall be carried out by the Chief Skill Expert in accordance with the Competition Standing Orders.

# **7. OCCUPATIONAL HEALTH AND SAFETY REQUIREMENTS 职业健康和安全要求**

## **7.1. OCCUPATIONAL HEALTH AND SAFETY REQUIREMENTS FOR THE COMPETITION**

Refer to the occupational health and safety documentation provided by the Skill Management Team.

## **7.2. SKILL-SPECIFIC OCCUPATIONAL HEALTH, SAFETY AND ENVIRONMENTAL REQUIREMENTS**

See documentation Workplace Safety Guidelines for the Computer Operator. There are no industry-specific requirements.

## **8. MATERIALS AND EQUIPMENT 耗材和设备**

### **8.1. INFRASTRUCTURE LIST 硬件清单**

The Infrastructure List details all the infrastructure, equipment, and consumables needed for the Test Project. The IL is the appendix to this document.

The name and quantity of materials and units of equipment requested by the Experts for the next competition are specified in the Infrastructure List. The Competition Organizer renews the IL, indicating the necessary quantity, type, version of the software, brand/model of items.

The Competition Organizer shall provide identical tools for all participants.

At each Competition, the Experts must review and update the Infrastructure List in preparation for the next Competition. The Experts must advise the Technical Director of the optimum use of the premises and changing the equipment lists.

At each Competition, the Chief Expert must audit the Infrastructure List that was used at that Competition.

The Infrastructure List does not include items that Competitors and/or Experts are required to bring and items that Competitors are not allowed to bring.

Following the competition results, if required, the Technical Expert and the Chief Expert must present the Competition Organizing Committee and the Skill Competition Manager with recommendations on the Infrastructure List changes.

### **8.2. MATERIALS, EQUIPMENT, AND TOOLS SUPPLIED BY COMPETITORS IN THEIR TOOLBOX 选手需要准备的耗材，设备和工具**

Standards and technical literature (in hard or soft version). 标准和技术文献

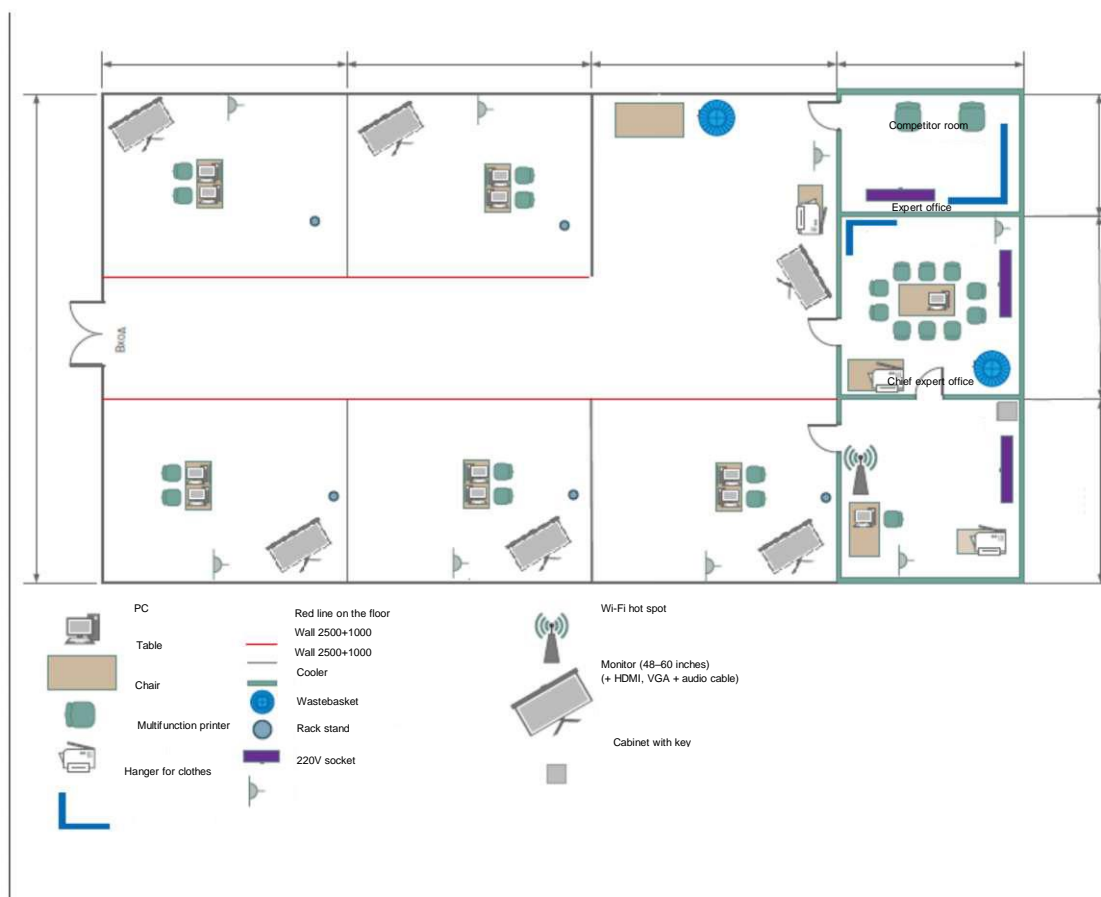
### 8.3. MATERIALS AND EQUIPMENT PROHIBITED IN THE SKILL AREA 比赛区域禁止的耗材和设备

Any materials and equipment brought by competitors shall be declared (presented) to the Experts. The Jury has the right to prohibit the use of any item not considered relevant to the skill or that may give the competitor an unfair advantage.

选手携带的任何耗材和设备应该向专家出示。评审委员会有权禁止任何与比赛不相关或者给选手带来不合理的好处的物品的使用。

### 8.4. PROPOSED COMPETITION WORKSHOP LAYOUT 建议的比赛工位布局图

Competition workshop layout (see illustration). 比赛工位图 (见插图)



## 9. SPECIAL RULES FOR THE 14-16 AGE GROUP 14-16 年龄



## 段特殊规则

The Test Project performance time shall not exceed 4 hours per day.

During the development of the Test Project and Marking Scheme, it is required to consider the specific features and limitations of the applied OHSE rules for this age group. It is also necessary to take into account the anthropometric, psychophysiological, and psychological characteristics of this age group. In this way, the Test Project and Marking Scheme may cover not all the WSSS units and areas depending on the specific features of the skill.