BIM Clash Report Analysis Using Machine Learning Algorithms

by

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ABSTRACT

Clash detection has been argued as one of the most beneficial BIM (Building Information Modelling) applications. However, the clash resolution process is still manually conducted and time-consuming, and BIM information is not fully utilized to facilitate automatic clash resolution.

Previous research employed machine learning and data mining methodologies to examine model coordination information and enhance the process of decision-making. Nevertheless, there are still deficiencies. Moreover, no prior study has pinpointed the attribute combination required for the precise anticipation of clash significance.

This research explores machine learning through two main avenues: firstly, categorizing clashes by image recognition and numerical data. Applying a Convolutional Neural Network multilayer (CNN) algorithm to different combinations of clashes achieved a precision of over 80%. The image clash recognition algorithm was also developed using YOLO v8's supervised CNN algorithm.

By forecasting clash significance with a high level of accuracy and recognizing the essential characteristics, this research makes a valuable contribution to the field of study within BIM and model coordination. Previous research had overlooked the collection of clashes across all disciplines and the identification of critical attribute combinations that result in accurate predictions. Furthermore, the development of a predictive model for clash significance presents new possibilities for professionals in the industry to enhance the efficiency of model coordination meetings by considering the disciplines, elements, and volumes of the clashes.

PREFACE

This thesis is an original work by Ibironke Regina Adegun completed under the supervision of Dr. Mohamed Al-Hussein.

This is an academic work that can be used by third parties, as long as internationally accepted rules and good practices are respected, particularly in what concerns author rights and related matters.

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LIST OF ABBREVIATIONS

AEC -	Architecture, Engineering and Construction (AEC) Industry
AI -	Artificial Intelligence
ANN-	Artificial Neural Networks (ANNs)
AR-	Augmented Reality
BCF-	Building Collaboration Format
BIM-	Building Information Modelling
CDE-	Common Data Environment
CNN-	Convolutional Neural Networks
DT-	Decision Trees
GIS-	Geographic Information Systems
HTML-	Hyper-Text Markup Language
HVAC-	Heating, Ventilation, and Air Conditioning
KNN -	k-Nearest Neighbors
MAP-	mean Average Precision
MEP-	Mechanical Electrical and Plumbing
RMSE-	Root Mean Square Error
VR -	Virtual Reality
WOS-	Web of Science
YOLO-	You Only Look Once

CHAPTER 1 INTRODUCTION

1.1 Background and Motivation

Building Information Modeling (BIM) coordination conflicts are characterized by spatial overlap of building components during the coordination of different discipline's drawings. These conflicts emerge as architects and engineers from various disciplines converge to create the federated BIM model leading to frequent clashes among various system components(Lopez & Love, 2012).

BIM clash detection is a critical component of construction projects aimed at identifying and resolving design conflicts early to improve project performance. The implementation of BIM enables collision analysis, known as clash detection, across various disciplines such as structural work, architecture, and MEP systems (Izzudin & Widiasanti, 2024). This process is mandated in many countries for public projects due to its importance in preventing errors and ensuring project accuracy (Huang & Lin, 2019a).

Researchers have emphasized the significance of enhancing clash detection algorithms in BIM software to improve the accuracy of clash identification and decrease the number of irrelevant clashes (Ahmadpanah et al., 2023). By enhancing the accuracy of clashes, the number of false positives can be minimized, leading to more efficient clash resolution processes.

Clash detection within Building Information Modeling (BIM) involves the identification of conflicts within a three-dimensional setting by conducting comparison checks between

various elements or disciplines (Pedo et al., 2021a). This procedure plays a critical role in error detection, reducing uncertainties in production procedures, and improving the overall coordination of projects.

Utilizing clash detection within BIM models can contribute to the prevention of accidents at construction sites through the detection of spatial clashes, anticipation of project risks, and provision of parametric data across the project's lifecycle (Alaloul et al., 2023). Figure 1 illustrates the steps taken by a BIM Coordinator during the clash detection process. By effectively addressing these issues related to accuracy, construction projects can optimize the utilization of BIM to facilitate the streamlining of clash resolution processes and enhance the overall outcomes of projects.

Figure 1: BIM Coordination process

The convergence of Machine Learning (ML) algorithms with Building Information Modeling (BIM) for clash detection and resolution in construction projects has generated substantial focus in recent academic investigations. Numerous studies have underscored

the potential of ML in automating clash resolution procedures during the design coordination of BIM models (Harode & Thabet, 2021). The focus is on developing ML algorithms capable of identifying elements and categorizing clashes to enhance the efficiency and precision of clash detection reports (Huang & Lin, 2019b). In contrast to traditional clash detection algorithms in BIM software that rely on spatial overlap, ML presents a more advanced approach by eliminating irrelevant clashes through rule-based reasoning and supervised ML techniques (Harode et al., 2023).

Modern clash detection software has numerous advantages in early clash detection in construction projects. However, several shortcomings are associated with these tools. One primary concern pertains to the accurate classification of clashes, which may result in time-consuming and expensive manual interventions (Huang & Lin, 2019a). Research shows that a notable percentage of clashes detected by Building Information Modeling (BIM) software are deemed irrelevant, posing challenges in differentiating relevant clashes from irrelevant clashes (W. Y. Lin & Huang, 2019a).

Additionally, the large number of clashes identified by clash detection software can overwhelm the BIM clash resolution process, impeding its effectiveness due to the significant resources needed for resolution (Meem & Iordanova, 2022a).

Machine learning can significantly contribute to automating the classification of clashes, as manual classification is often time-consuming and costly(Huang & Lin, 2019a). By harnessing graphical information and attributes inherent in BIM elements, ML models can be formulated to streamline clash resolution processes. The integration of ML in clash

detection not only enhances efficiency but also results in cost savings for construction projects (Chahrour et al., 2021a). Furthermore, ML can assist in the quality assurance of BIM models, providing a fresh outlook on ensuring model precision and dependability (Esmaeili et al., 2024).

The potential benefits of implementing ML algorithms for clash detection in BIM models extend to various aspects of construction projects, including improved constructability, error reduction, sustainability, and enhanced productivity (Okereke et al., 2021). ML algorithms can optimize clash correction sequences, leading to more efficient clash resolution processes (Hu, Castro-Lacouture, Eastman, et al., 2020). By automating clash detection and resolution, ML contributes to early collaboration and reduces clashes through 3D design coordination (Akponeware & Adamu, 2017).

The impetus to explore BIM clash report analysis using ML algorithms emanates from the necessity to refine clash detection and resolution procedures in construction projects. Through the integration of ML with BIM, researchers endeavour to automate clash resolution, enhance classification accuracy, reduce expenses, and augment overall project efficiency. The potential of ML in streamlining clash detection processes and optimizing construction workflows underscores the importance of further investigating this integration in the field of construction project management.

1.2 Research objectives

This research will focus on using the network to pre-process clash reports by cleaning out irrelevant clashes and classifying relevant clashes. It proposes the use of machine learning methods to predict and accurately clash detection and management.

Clash management processes can be improved by automatically distinguishing between relevant and irrelevant clashes, allowing project team members to focus on more sensitive design and construction issues.

This research successfully analyzed clash detection reports from different projects. This research aims to achieve the following:

Identifying the shortcomings of current clash resolution automation approaches that use supervised machine learning only.

Process clash detection report by grouping and cleaning out irrelevant clashes and then labelling relevant clashes

Propose a new framework to automate clash resolution using machine learning by:

Firstly, by analyzing the non-geometric data from the clash detection report checking for data predictability using multiple classifiers.

Then YOLOv9, a deep learning algorithm using Convolutional Neural Networks (CNN) for image recognition

1.3 Thesis organization

This dissertation is divided into five chapters, The first chapter being the introduction and it is organized systematically to the fifth and final chapter on the dissertation conclusions. The first chapter introduces the subject of BIM clash resolution in the construction industry. It also clearly states the motivation behind the dissertation topic and strategic objectives.

The second chapter “Literature Review” takes a look at current and past research and literature on machine learning applications in BIM coordination. It also discusses machine learning applications, BIM Coordination, industry trends and knowledge gaps in design clash resolution. This chapter also highlights the potential benefit of machine learning in BIM coordination.

Chapter three explains the methodology or research approach that was taken in this dissertation. It is organized into different sections. The first section explains the overview of the encompassing methodology. The other section goes through the steps taken and the multiple software used to generate clash detection reports.

Due to the implementation process involved in this research, chapter 4 discusses the results generated from this research. The results are broadly classified into the non-geometric data results and the image processing results.

The final chapter, chapter five gives a short recap of the research objectives achieved and the identified gaps in the literature. It explains the conclusions drawn from the ML framework developed. The rest of this chapter discusses research contributions and future works.

CHAPTER 2 LITERATURE REVIEW

This chapter presents an overall review of the existing research related to the subject matter. The first section looks into BIM coordination

2.1 BIM Coordination

BIM coordination has significantly evolved over time, revolutionizing the Architecture, Engineering, and Construction (AEC) industry. Initially, the introduction of BIM brought about substantial improvements in coordinating construction projects and fostering collaboration among professionals (Olawumi et al., 2017). The adoption of BIM has fundamentally transformed the design, construction, and operational processes within the AEC industry, leading to a shift in approach to reduce errors, enhance workflows, and facilitate coordination during project management (Liu et al., 2020). As BIM continues to advance, there is a growing trend in the coupling coordination between regional BIM policies and typical BIM projects, indicating an increasing degree of coordination over time (Zhu et al., 2022).

Moreover, the implementation of BIM has paved the way for organizations to progress on the BIM maturity ladder, providing a roadmap for wider BIM adoption and offering guidance for developing sound BIM strategies (Khosrowshahi & Arayıcı, 2012). The evolution of BIM coordination has also emphasized the cooperative design of BIM components, virtual-real world coordination, and the integration of BIM with urban

management, enhancing planning, construction, management, and maintenance processes (Kuai, 2023).

Furthermore, the evolution of BIM adoption has led to the creation of various positions within organizations to implement BIM effectively, transitioning from understanding "What is BIM?" to focusing on "How to use BIM?" (Tai & Latiffi, 2022). However, challenges such as the absence of a structured BIM coordination process have been identified, leading to inefficiencies, slow progress, increased costs, and disruptions during implementation (Tuan, 2019).

In conclusion, the evolution of BIM coordination has been marked by significant advancements in integrating design, construction, and facility management processes, enhancing collaboration, reducing errors, and improving overall project outcomes within the AEC industry. As BIM continues to mature, it is expected to play a crucial role in shaping the future of construction project coordination and management as shown in the publication keywords shown in Figure 2.

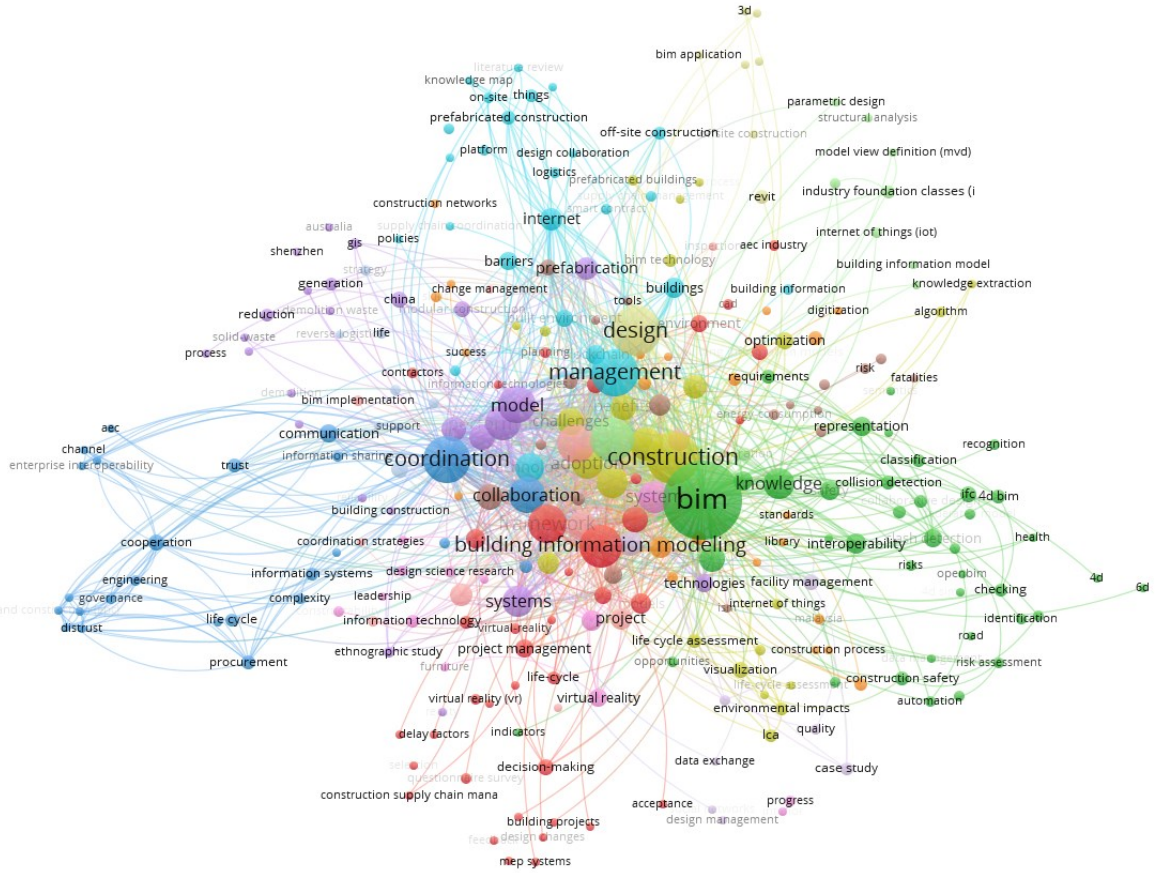

Figure 2: Cluster for the search of keywords in BIM Coordination publications (1900—2024) Source; Web of Science WOS

2.1.1 Issues facing BIM Coordination

The most common issues encountered during BIM coordination among architects, engineers, and construction professionals include missing model elements, lack of consideration for operability or maintainability, inaccurate as-built model updates(Alsuhaibani et al., 2022).

Additionally, challenges such as people being comfortable with conventional processes, high software costs, lack of in-house expertise, training/education on BIM, awareness of

BIM, collaboration issues, client demands, uncertain government commitment to BIM, lack of standardization, resistance to change, and inadequate contractual coordination are prevalent (Mayer et al., 2022a).

Issues encountered during BIM coordination among architects, engineers, and construction professionals stem from various factors. The adoption of a collaborative BIM approach complicates matters further (Alreshidi et al., 2017). For instance, using BIM solely as a 3D modeling tool without data exchange with other disciplines can lead to fewer interoperability issues and coordination difficulties compared to complete BIM integration (Hong et al., 2019). Challenges also arise from inadequate coordination between different BIM systems, causing conflicts (Fang et al., 2023a).

Moreover, the collaborative nature of BIM poses practical problems in model creation, such as low-quality models, the need for rework, and incorrect model creation (Y.-C. Lin & Yang, 2018). The implementation of BIM tends to prolong the design period in practice, despite its theoretical potential to facilitate collaboration among diverse design participants (J. Wang et al., 2021). Additionally, the lack of technical expertise and a robust standard for BIM usage in the construction industry presents notable challenges.

Furthermore, issues in BIM coordination include inactive design institutes, inconsistent data standards, and a shortage of BIM talent, particularly in regions like China. The collaborative work environment facilitated by BIM can enhance communication between design and construction teams, but it also introduces complexities that challenge project management (Arrotéia et al., 2021). The success of integrating BIM with other technologies like GIS(Geographic Information System) can be a significant achievement in addressing problems in various sectors (Sani & Abdul Rahman, 2018).

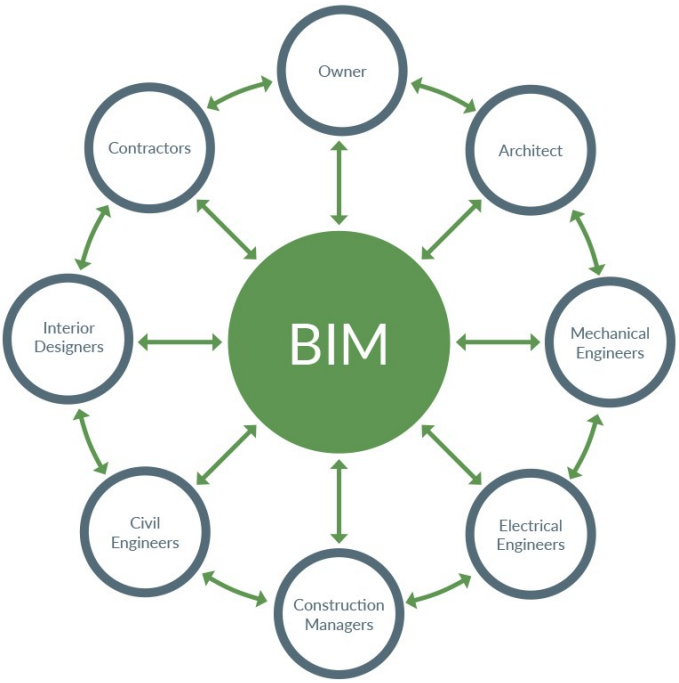

Figure 3: Stakeholders involved in the BIM coordination process adapted from (BIMTech, 2023)

Architects, engineers, and construction professionals face a number of challenges when it comes to BIM coordination, including problems with interoperability, disputes arising from inadequate coordination, protracted design durations, a lack of technical skills, and standardization issues. Figure 3 illustrates the important stakeholders involved in the

coordination process, In order to meet these hurdles and guarantee successful BIM implementation and collaboration in building projects, a comprehensive strategy that takes organizational, technical, and human elements into account is needed.

To improve BIM coordination effectiveness and project results, these problems must be resolved because they cause construction delays, cost overruns, and lower-quality projects.

2.2 Clash Detection Evolution

In the field of construction and engineering, the progression of clash detection has undergone substantial development over time, primarily steered by technological advancements and enhanced software capabilities. Initially, the practice of clash detection entailed manual verifications and coordination across various disciplines to detect interferences or clashes within architectural designs(Pärn et al., 2017a).

Nonetheless, with the emergence of BIM software, the process of clash detection has transitioned towards increased automation and efficiency. A pivotal milestone in the advancement of clash detection is marked by the introduction of BIM software, such as Autodesk Navisworks, Revit, and Tekla Structures. These software applications empower diverse disciplines to construct 3D models of their designs and superimpose them for clash identification (Mayer et al., 2022b). The algorithms for clash detection embedded within these software platforms scrutinize the spatial correlations among different elements within the models and pinpoint any intersections or overlaps, thereby enabling designers and engineers to resolve conflicts proactively prior to the commencement of construction

activities. Moreover, the fusion of clash detection with project management software has further refined the coordination process(Brynjolfsson et al., n.d.).

Through the correlation of clash detection outcomes with project timelines and cost estimates, project teams are able to prioritize and tackle clashes based on their repercussions on the project schedule and financial plan. This amalgamation has bolstered communication and collaboration among project stakeholders, consequently fostering more efficient clash resolution and diminishing rework during the construction phase. Another noteworthy facet of clash detection evolution is the assimilation of sophisticated visualization methodologies. The utilization of Virtual Reality (VR) and Augmented Reality (AR) technologies for visualizing clash detection outcomes in immersive settings enables project teams to delve into clashes in a more intuitive and interactive manner. This not only enriches the comprehension of clash issues but also facilitates superior decision-making and coordination among team members. To sum up, clash detection has transitioned from manual inspections to automated procedures within BIM software, harmonized with project management utilities, and enriched by advanced visualization technologies (Hu et al., 2023). These developments have significantly ameliorated the efficiency and efficacy of clash detection in construction ventures, thereby yielding cost efficiencies, error reductions, and smoother project completion.

2.2.1 Frameworks and Tools Promoting Clash Avoidance

Frameworks and tools promoting BIM clash avoidance in construction include Autodesk Navisworks and Autodesk Revit, which are utilized for clash detection analysis in BIM models. These tools enable the early identification of clashes between architectural, structural, and MEP disciplines, reducing miscommunication and misunderstandings during

the construction phase. By integrating BIM models and conducting clash detection analyses, conflicts can be resolved before construction begins, leading to improved project efficiency and cost-effectiveness. Additionally, the use of BIM Collaboration Format (BCF) and Common Data Environment (CDE) principles enhances MEP coordination and clash management, ensuring higher quality projects with minimized delays and costs. The application of BIM tools like Autodesk Navisworks also aids in automatically grouping clashes, prioritizing resolutions, and identifying irrelevant clashes for more effective clash detection processes.

BIM has significantly impacted the construction industry by providing advanced tools and frameworks to improve clash avoidance during project development. Research has indicated that issues such as isolated working and a lack of BIM-specific training among design practitioners can lead to clashes in 3D BIM systems (Sani & Abdul Rahman, 2018). BIM models have been effectively used for clash detection, design enhancement, and digital mock-ups in infrastructure projects (Vilventhan et al., 2021). By allowing visualization and prediction of potential clashes before construction begins, BIM helps in anticipating and preventing problems (Latiffi et al., 2016).

Clash detection tools within BIM software enable the early identification of clashes, which in turn facilitates prompt resolution (W. Y. Lin & Huang, 2019). Furthermore, utilizing BIM-enabled clash detection processes aids in error identification, thereby reducing uncertainties in building construction projects (Chahrour et al., 2021b). Studies have demonstrated substantial cost savings through BIM clash detection, with one example reporting savings of $135,000 with just a $4,000 investment in BIM tools (Daszczyński et al., 2022).

Additionally, BIM tools like 3D/4D/5D models support clash detection, quantity take-off, construction simulation, and project scheduling, ensuring projects are completed on time.

Proposed frameworks that combine BIM with genetic algorithms aim to automate clash resolution in structural design, thereby enhancing clash avoidance at critical joints (Liu et al., 2019). The enforcement of clash detection in public projects through building codes highlights the importance of resolving design conflicts for project success (W. Y. Lin & Huang, 2019). Moreover, BIM models integrated with data have been pivotal in various construction applications, including clash detection, design optimization, and simulations (Hu, Castro-Lacouture, & Eastman, 2020).

Despite the advantages of BIM in clash detection and coordination, challenges persist, such as dimensional variability in construction assemblies (Nahangi et al., 2017). Various strategies have been suggested, from shared situational awareness to machine learning frameworks, to enhance clash avoidance in multidisciplinary coordination (Meem & Iordanova, 2022b). The integration of Lean principles into BIM-based clash management processes shows potential to improve clash resolution efficiency (Pedo et al., 2021b). Construction projects can avoid conflicts by using BIM tools and frameworks, which facilitate early identification, quick settlement, and economical clash management. It is essential to conduct ongoing research and make technological improvements in BIM to improve clash avoidance techniques and maximize project results.

2.2.2 Review of Causes of Clashes and Clash Avoidance Strategies

Current BIM clash avoidance strategies have proven to be effective in preventing conflicts during the design phase (Abdalhameed & Naimi, 2023). By utilizing tools like Autodesk Navisworks and Revit, clashes between architectural, structural, and MEP models can be identified and resolved before construction begins, reducing the likelihood of reworks and cost overruns (Malsane et al., 2022). These strategies involve early collaboration among different disciplines, enabling the detection of clashes through 3D model coordination. The use of BIM Clash Detection applications helps streamline the identification and resolution of clashes, ensuring that relevant clashes are addressed before construction commences. However, challenges such as the large volume of clashes and the multiple stakeholders involved necessitate scientific management of clashes for better segregation and resolution(S & George, 2022).

To assess the effectiveness of current BIM clash avoidance strategies during the design phase, it is crucial to consider the existing literature on BIM practices and their impact on conflict prevention. (Cao et al., 2015) provide insights into BIM practices in construction projects in China and evaluate how these practices influence their effectiveness. This study offers valuable information on the practical application of BIM in clash avoidance strategies.

Additionally, (Bradley et al., 2016) present a unique research strategy for information governance in BIM for infrastructure projects, shedding light on how governance frameworks contribute to clash avoidance and project efficiency. Understanding the governance structures and data environments in BIM implementation can provide crucial insights into enhancing clash avoidance strategies. Also, (SUN et al., 2015a) discuss factors limiting the application of BIM in the construction industry, including cost savings and decision-making

improvements, which are essential aspects for evaluating the effectiveness of clash avoidance strategies. By examining the barriers to BIM adoption, this study highlights challenges that impact clash detection and avoidance in the design phase.

Furthermore, (Alemayehu et al., 2022) emphasize the role of BIM models in facilitating integrated project delivery, coordination, and clash detection, underscoring the importance of visualizing project phases for conflict prevention. This study provides valuable insights into how BIM models enhance clash avoidance strategies during the design phase. In conclusion, synthesizing the findings from these studies can lead to a comprehensive understanding of the current effectiveness of BIM clash avoidance strategies in preventing conflicts during the design phase. These references offer diverse perspectives on BIM practices, governance frameworks, barriers to adoption, and the role of BIM models in clash detection, which are essential factors in evaluating the efficacy of clash avoidance strategies in BIM coordination.

2.3 Design conflict resolution.

Conflict resolution in construction design is a crucial factor that significantly impacts project success. Various methods have been suggested to address conflicts in construction projects. One strategy involves assessing conflict preventability by identifying conflict types, which can then be integrated into construction contracts as a conflict resolution mechanism (Charkhakan & Heravi, 2019). Additionally, a model has been proposed to evaluate the quality of conflict management in construction projects, focusing on dimensions such as satisfactory resolution outcomes, integrated resolution processes, conflict prevention, fairness perception, and post-conflict effects (Zhu et al., 2020).

Negotiation and conflict resolution methods in construction projects can be classified into self-regulation by involved parties or third-party intervention using litigation/court methods, administrative processes, and alternative dispute resolution like mediation and arbitration (Nisa & Sihidi, 2022). Research indicates that conflicts can have adverse effects on project success and should be addressed through clash resolution methods (Leung et al., 2005). It has been noted that conflicts in construction projects can escalate into disputes that may necessitate resolution through arbitration, litigation, or alternative dispute resolution methods as stipulated in contracts (Acharya et al., 2006).

In collaborative design environments, conflict resolution methods have been proposed based on grid services and tracking design dependencies to facilitate conflict management (Luo et al., 2008) ; (Ouertani et al., 2007) Furthermore, the impact of inter-organizational conflicts on project performance, particularly in international construction projects, underscores the significance of effective conflict management strategies (Wu et al., 2017). Various techniques have been explored for systematically resolving conflicts in goal-driven requirements engineering by introducing new goals or transforming specifications to achieve conflict-free versions (van Lamsweerde et al., 1998). Conflict resolution in construction design requires a comprehensive approach that includes evaluating conflict preventability, assessing the quality of conflict management, and utilizing negotiation methods and third-party interventions. Understanding conflict types, implementing efficient conflict resolution mechanisms, and managing conflicts systematically are essential for achieving successful outcomes in construction projects.

2.4 Knowledge Gaps in BIM Coordination

BIM coordination faces several knowledge gaps that researchers have identified. One critical aspect is the need to define BIM's knowledge components and expand boundaries to allow for a systematic investigation of its various fields (Succar, 2009). Additionally, there is a gap in understanding the potential and expectations of a BIM-based system for early collaboration among contractors, facility management teams, and design teams during the design stage (H. Wang et al., 2018). The lack of experience in managing subcontracting works in BIM projects can lead to contractual risks that require closer attention by project teams (Alwee et al., 2023).

Moreover, inadequate coordination between different BIM components can result in conflicts, highlighting a gap in seamless integration (Fang et al., 2023b). The challenges of handling information dispersed across disciplines and stakeholders underscore the importance of BIM tools in improving collaboration and project coordination, particularly in heritage-building projects (Thravalou et al., 2023). Furthermore, the lack of clarity about process coordination and information exchange requirements adds to the management issues faced in achieving successful 'Green BIM' certification (Gandhi & Jupp, 2014).

Research has also emphasized the complexity of collaborating with BIM and the challenges it poses to project management (Papadonikolaki et al., 2019). The barriers to BIM adoption in various regions, such as Jordan and Malaysia, further highlight the difficulties arising from ineffective coordination and planning in contractual processes (Matarneh & Hamed, 2017).

Additionally, the impact of collaboration among stakeholders on BIM adoption underscores the significance of addressing coordination challenges to enhance BIM implementation(Doan et al., 2021).The identified knowledge gaps in BIM coordination encompass the need for defining knowledge components, enhancing early collaboration, addressing contractual risks, improving integration between BIM components, and streamlining coordination processes to facilitate successful BIM adoption and implementation.

2.4.1 Clash Detection

The limitations in BIM clash detection technology are multifaceted and have been highlighted by various researchers. One significant gap lies in the simplicity of clash detection algorithms in most BIM software, where conflicts are identified based on spatial overlap, contact, or proximity, potentially leading to an oversimplification of clash identification.(W. Y. Lin & Huang, 2019a). This limitation underscores the need for more advanced algorithms that can differentiate between different types of clashes and provide more accurate and detailed clash reports.

Furthermore, while BIM technology has enabled designers and engineers to detect clashes and simulate construction scenarios for better decision-making (Noghabaei et al., 2020), the manual classification and resolution of clashes detected by BIM software remain challenging (Huang & Lin, 2019a). This manual process can be time-consuming and error-prone, indicating a gap in automated clash resolution methods that can streamline the coordination process.

Moreover, the lack of comprehensive training in clash detection and coordination for construction professionals, as identified in the Nigerian context, reveals a significant gap in

skill development in areas such as design creation, clash detection, and space management (Oyewole & Dada, 2019). Bridging this training gap is crucial to enhancing the effectiveness of clash detection processes within BIM projects.

Additionally, the reliance on traditional 2D-based coordination methods by some designers, leading to potential misinterpretations of clash detection results, highlights the importance of addressing knowledge gaps in the use of clash detection software tools (Akponeware & Adamu, 2017). Improving the understanding and proficiency of designers in utilizing BIM-based clash detection tools can help mitigate errors and enhance the accuracy of clash identification.

In conclusion, the identified knowledge gaps in BIM clash detection technology encompass the need for more sophisticated clash detection algorithms, automated clash resolution methods, comprehensive training for construction professionals, and improved proficiency in utilizing clash detection software tools to enhance the accuracy and efficiency of clash identification and resolution processes.

2.5 Machine Learning

Machine learning has revolutionized various fields by providing advanced computational capabilities and automation. Recent research has showcased the diverse applications of machine learning in different domains, highlighting its potential for enhancing efficiency, accuracy, and decision-making processes.

(Cong et al., 2019) introduced quantum convolutional neural networks, demonstrating the fusion of quantum error correction and convolutional neural networks. This work signifies the cutting-edge advancements in machine learning technologies. (Carrasquilla, 2020) explored the application of supervised machine learning algorithms in predicting atomization

energies, showcasing the potential of machine learning in molecular and materials science.

(Xiao et al., 2022) proposed machine learning methods for automated classification and anomaly detection in large-scale BIM projects, emphasizing the role of machine learning in improving construction processes. (Huang & Lin, 2019b) highlighted the widespread use of machine learning in civil engineering applications, such as monitoring construction progress and regulatory inspections using BIM.

Machine learning has also been applied in various architectural and design contexts. (Dai, 2023) discussed space reconfiguration through architect and agent simulation-based machine learning, illustrating the role of machine learning in knowledge management. Lin et al. (2019) focused on optimizing routerless Network-on-Chip designs using a learning-based framework, indicating the potential for machine learning in computer security and latency reduction.

Moreover, machine learning has found applications in privacy-aware data forensics (Babar et al., 2021), federated learning systems, and side-channel analysis (Jin et al., 2020), showcasing its versatility in addressing complex challenges across different domains. Additionally, automated machine learning on graphs (X. Wang & Zhu, 2021) and neural architecture search for skin cancer detection (Nikhil Kandukuri et al., 2021) represent the innovative applications of machine learning in graph analysis and medical diagnostics, respectively.

Figure 4: TreeMap Chart showing subject areas of machine learning publications

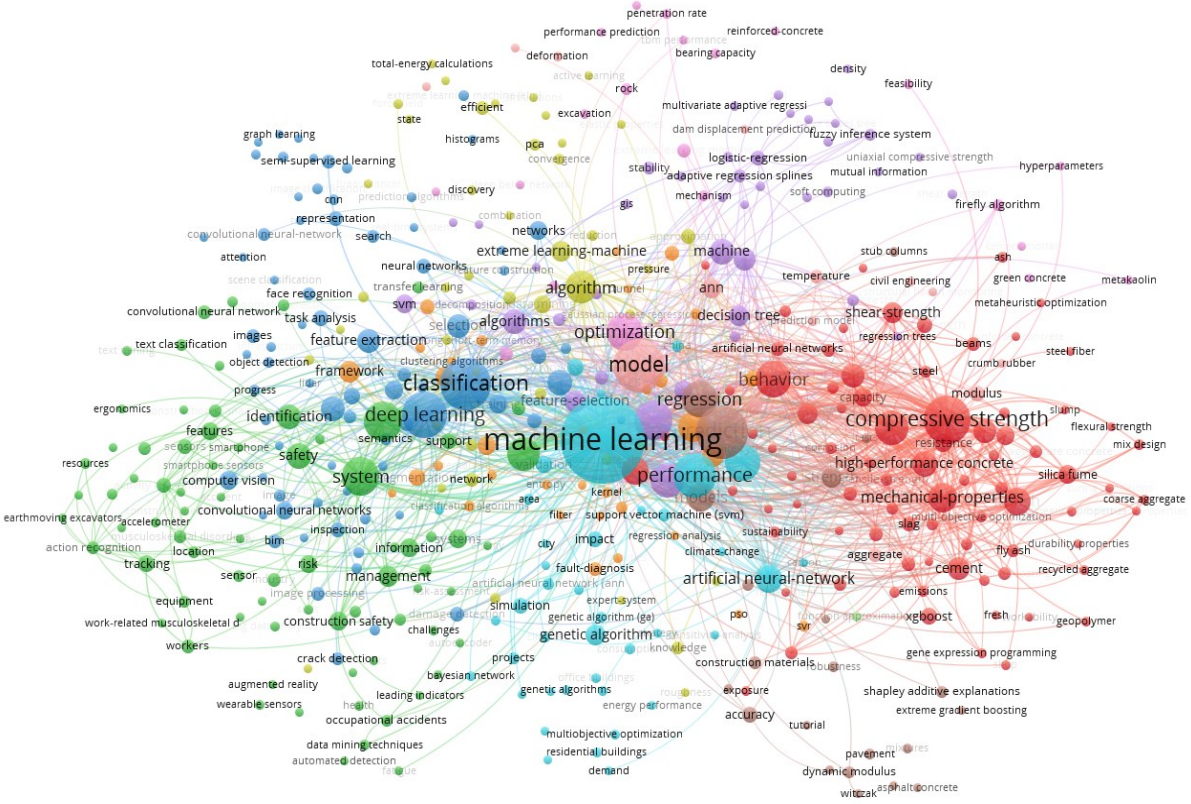

Figure 5: Network visualization of keywords in ML in construction application publications (1900—2024) Source; Web of Science WOS

2.5.1 ML Applications in Construction

In the last fifty years, significant technological advancements in machine learning (ML) and deep learning (a subset of ML) have led to significant changes in different industries. It has also developed into a potent instrument that can automate construction processes, which perform and produce less well than other industries(Paul Teicholz, 2013).

Utilizing Machine Learning for automating clash resolution during design review and coordination of BIM models in construction projects has been explored (Harode et al., 2022)Machine Learning has shown the potential in enhancing clash resolution efficiency and accuracy. The benefits of BIM in early clash detection and resolution, particularly in formwork planning, have been emphasized (Singh et al., 2017). Leveraging BIM data for clash identification can lead to improved constructability and streamlined construction processes.

Optimizing clash resolution in BIM coordination through Clash Dependent Networks has been explored (Hu et al., 2020). Understanding feedback relations and optimizing clash resolution processes can lead to more efficient conflict resolution in construction projects.
The widespread adoption of BIM functions such as 3D visualization, clash identification, and constructability analysis in the Malaysian construction industry has been highlighted (Tanko et al., 2022). Understanding the utilization of BIM functions can contribute to effective clash resolution strategies.

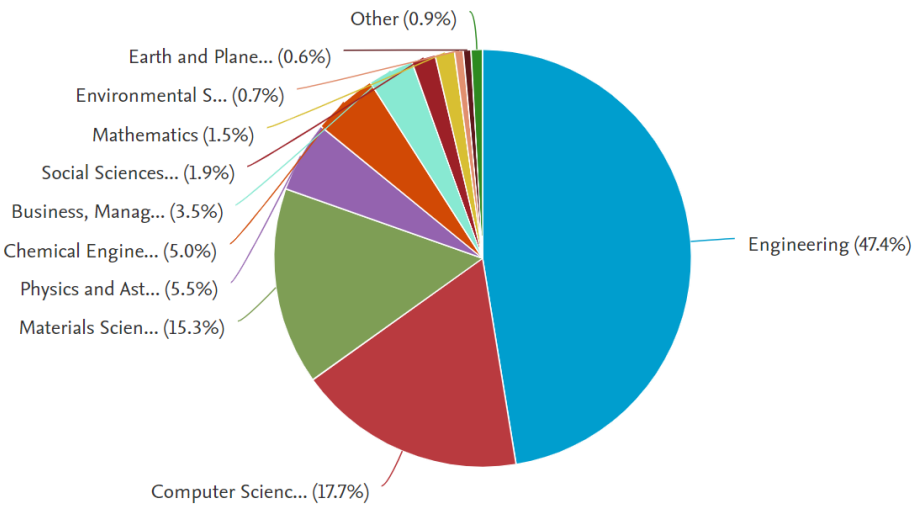

Figure 6: Industries Publishing in Machine Learning

Figure 6 above shows the distribution of subject matter results of publications from 1995 to 2024 on machine learning in construction. This was analyzed using Scopus with the prompt [TITLE-ABS-KEY (machine AND learning AND construction) AND (LIMIT-TO (LANGUAGE, "English"))].

2.6 Evolution of Machine Learning

The concept of machine learning can be traced back to the mid-20th century. In the year 1950, Alan Turing put forth the concept of a "learning machine" in his influential work titled "Computing Machinery and Intelligence." Turing suggested the possibility of training a machine to demonstrate intelligent actions, thereby captivating the interest of scholars. Nevertheless, advancements in practice were hindered by the slow progress resulting from the constraints in computational capabilities and the early stages of foundational theories (A.

M. Turing, 1950).

The 1950s and 1960s saw the birth of artificial intelligence (AI), a field closely related to ML. The Dartmouth Conference in 1956 is often cited as the event that formally introduced AI as a research discipline. The evolution of machine learning has been a dynamic and transformative journey over the past few decades. Initially constrained by limited computing power, the field has witnessed significant advancements with the advent of high-performance computers, propelling rapid development from traditional expert systems to the current era dominated by deep learning (Sánchez Fernández & Peters, 2023). This transition has been fueled by the exponential increase in computing power, enabling the exploration of complex algorithms and models that were previously unattainable.

The integration of machine learning with big data environments has been a pivotal development, necessitating modifications to existing techniques to address the challenges posed by vast datasets (Q. Wang et al., 2017). The evolution of machine learning in healthcare, for instance, has seen exponential growth, leveraging historical contexts to drive innovation and improve predictive capabilities. Furthermore, the intersection of evolutionary biology and machine learning has opened new avenues for enhancing learning processes through an evolutionary lens (Aguilar et al., 2019).

Machine learning's historical roots trace back to the mid-20th century, when early researchers delved into simulating human intelligence and learning in machines, setting the stage for subsequent advancements (Grigoras et al., 2024). The 2010s marked a turning point for machine learning, characterized by technical breakthroughs, increased computing power, and the availability of extensive databases, paving the way for the widespread adoption of deep

learning techniques (Sánchez Fernández & Peters, 2023).

The application of machine learning extends across diverse domains, from fluid mechanics to protein engineering, showcasing its versatility and impact on various scientific disciplines (Brunton et al., 2020). Machine learning-guided approaches have revolutionized biological design, offered efficient optimization strategies and accelerating engineering processes (Yang et al., 2019). Moreover, machine learning has enabled the modelling of complex systems, such as quantum processes and spatiotemporal dynamics, providing valuable insights and predictive capabilities (Banchi et al., 2018). Nowadays, Machine Learning (ML) is a dynamic and swiftly progressing domain. The incorporation of ML into the construction industry has become widespread.

2.6.1 Shallow learning

Shallow learning in machine learning refers to the utilization of simpler models that have a limited number of layers or parameters compared to deep learning models. Shallow learning methods, such as simple artificial neural networks (ANNs) like shallow autoencoders and traditional machine learning algorithms like decision trees, are characterized by their relatively straightforward structure and limited complexity (Janiesch et al., 2021). These models are often used in scenarios where the data is not as complex or where interpretability is crucial.

Despite the rise of deep learning with its complex neural networks and multiple layers, shallow learning methods remain relevant, especially in certain applications. Shallow machine learning techniques are commonly employed in text processing tasks, such as text

classification, where supervised learning methods using shallow models are still popular even as deep learning methodologies advance rapidly (Setiabudi et al., 2021). Additionally, shallow learning models like Linear Regression, Support Vector Machines (SVM), Decision Trees (DT) and K-nearest Neighbors (KNN)) are utilized in signal processing applications, such as ultrasonic guided wave analysis for damage detection (Shang et al., 2023).

Shallow learning models have shown effectiveness in scenarios with limited data, where deeper networks may not perform optimally (Erichson et al., 2020). For instance, in fluid flow reconstruction with limited sensors, shallow neural networks have been found to be more suitable than deeper networks (Erichson et al., 2020). Moreover, shallow learning frameworks have been explored for specific tasks like mountainous skyline extraction, showcasing the adaptability of these models across different domains (Touqeer Ahmad et al., 2021).

The distinction between shallow learning and deep learning lies in the complexity and depth of the models. Shallow learning models are characterized by their simplicity and limited capacity to capture intricate patterns in data compared to deep learning models with multiple layers that can learn hierarchical representations of data (Poggio et al., 2017). While deep learning has gained prominence for its ability to handle complex data and tasks, shallow learning methods continue to play a significant role in various applications, offering simplicity, interpretability, and efficiency in scenarios where deep models may not be necessary or suitable.

2.6.2 Deep learning (CNN)

Deep learning, particularly Convolutional Neural Networks (CNNs), has significantly impacted the field of machine learning by enabling automated feature extraction and learning from raw data without human intervention (LeCun et al., 2015). CNNs are a type of deep learning architecture known for their effectiveness in tasks such as image recognition, object detection, and image segmentation (Scaria & V V, 2019). These networks consist of multiple layers that enable them to learn hierarchical representations of data with various levels of abstraction (LeCun et al., 2015).

CNNs have found applications in diverse domains, including medical imaging, where they have shown promise in tasks such as disease diagnosis and medical image analysis (Erickson et al., 2017). In geology, CNNs have been utilized for classifying geological structures like anticlines in seismic data, showcasing their versatility across different fields (Rondon, 2020). In computer vision, CNNs have become a popular method for tasks such as object recognition in images or videos, demonstrating state-of-the-art performance in visual recognition tasks (Scaria & V.V, 2019).

The concept of a CNN lies in its ability to extract local features from higher-level inputs and propagate them to lower layers to facilitate intricate feature acquisition. CNN comprises convolutional, pooling, and fully connected layers. An illustrative CNN architecture showing these layers is depicted in Figure 2-5. The strength of CNNs lies in their ability to automatically learn features from extensive datasets, allowing them to capture rich and unique information present in the data (Lin Li et al., 2018). These networks have been instrumental in various applications, such as signal modulation recognition, traffic sign recognition, and human activity recognition, highlighting their broad utility in diverse problem domains (Albaba et al., 2020). Moreover, CNNs have been employed in tasks like improving image quality assessment and

detecting small targets in oversampling images, underscoring their effectiveness in enhancing image processing tasks (Ahmed et al., 2019).

The evolution of deep learning, particularly through CNNs, has ushered in a new era of machine learning capabilities, enabling more sophisticated and accurate modelling of complex data. By leveraging the hierarchical representations learned by CNNs, researchers and practitioners can address a wide range of tasks across different domains with improved efficiency and accuracy.

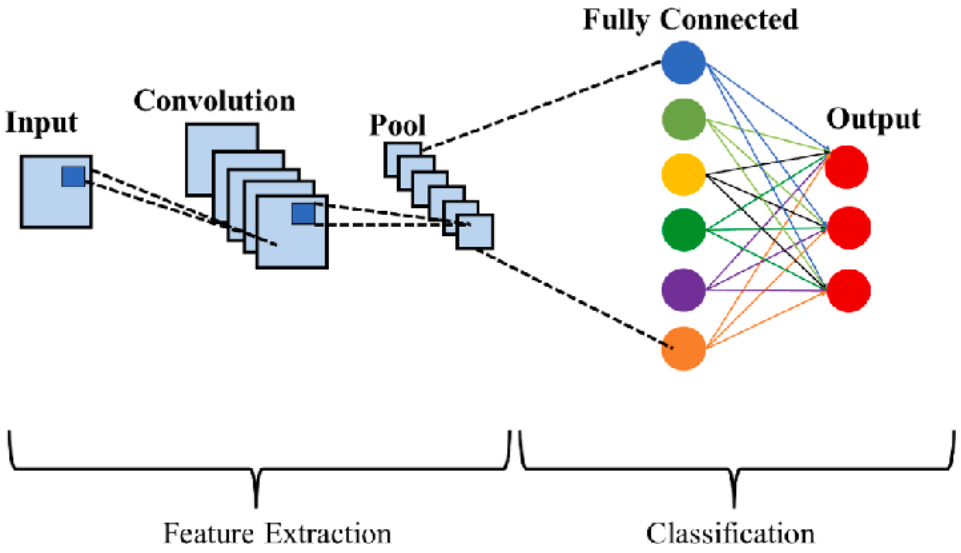

Figure 7: Schematic of Convolutional Neural Network (CNN).

CHAPTER 3. METHODOLOGY

BIM-enabled clash detection has been criticized for including many irrelevant clashes. One good way to examine BIM clash reports is through machine learning methods. With machine learning, clash reports can be processed automatically by identifying recurring patterns and root causes of clashes from a large number. This is achieved through advanced algorithms and models. The reason why machine learning is the best for analyzing BIM clash reports is that it can bring out hidden insights or correlations which may not be obvious when using traditional manual methods of analysis.

In addition, machine learning models can be trained to identify and prioritize the most critical clashes based on their potential impact on project timelines and budgets. This enables project teams to focus their efforts on addressing the most pressing clashes first, ultimately leading to more efficient and cost-effective resolution strategies.

Furthermore, machine learning can also be integrated with BIM software to provide real-time clash detection and resolution recommendations. This proactive approach can significantly reduce the number of clashes that may arise during the construction phase, thereby minimizing rework and delays.

The automated classification of clashes detected by BIM software remains a challenge, necessitating the development of methods that integrate rule-based reasoning and machine learning for efficient clash resolution (Huang & Lin, 2019b). Future research directions suggest automating clash detection management, analyzing organizational influences on clash propagation, and developing new procedural methods to mitigate clashes using real-life

projects (Pärn et al., 2017b). Additionally, the integration of machine learning techniques with BIM has been explored to enhance clash status in construction projects (Ghorbany et al., 2024).

The adoption of BIM-based clash detection has been associated with substantial cost savings in construction projects, such as the General Motors Production Plant estimating savings of 3-5% through automated clash detection and an additional 2-4% through 3D digital workflows (SUN et al., 2015b). Furthermore, leveraging the synergy between lean construction principles and BIM, such as waste minimization and enhanced learning, can improve clash detection processes and project outcomes (Koseoglu et al., 2018).

3.1 Overview

To achieve the research objectives two approaches were taken to evaluate the clash detection reports. Evaluating the graphic data and the textual data separately.

By combining rule-based reasoning and supervised machine learning, BIM software can enhance clash identification accuracy and streamline clash resolution workflows, ultimately leading to cost savings and improved project efficiency.

Taking an holistic view of this research, the input was the well-developed federated model was brought together in the Autodesk Revit environment. The clash matrix was created independently following a structure that matches the research objectives with emphasis on MEP (mechanical, electrical and plumbing) systems clashing with architectural/ structural elements. The Figure below illustrates the overall approach taken in this research.

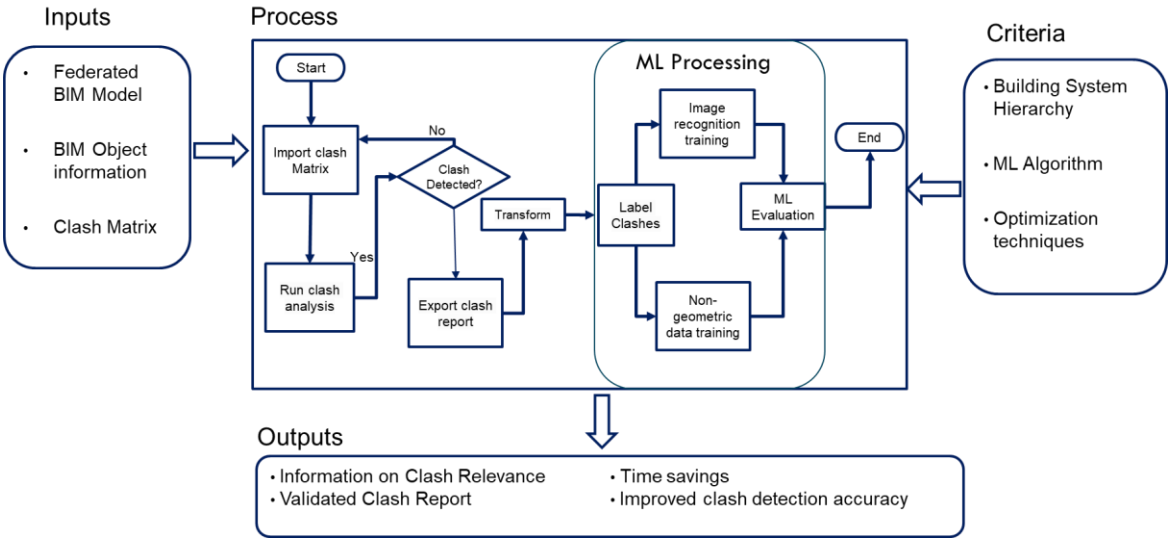

Figure 8: Overview of Research Methodology

3.2 Pre-Clash Modelling

Pre-clash modelling is a step that is often trivialized during the BIM Coordination process. However, it is an essential step that determines the success of the coordination process. The clash detection process consists of many small steps which are listed below:

Define Scope and Objectives: Clearly define what the pre-clash test aims to achieve, including specific areas or systems to be tested. The next step is to gather requirements.

Collect all necessary project documentation, including architectural, structural, MEP (mechanical, electrical, plumbing), and other relevant drawings. Collect Design Models: Obtain 3D models from all disciplines involved in the project (e.g., architecture, structure, MEP).

Ensure Model Compatibility: Ensure that all models are in compatible formats and coordinate systems. Convert models to a common format if necessary.

Model Integration, System Hierarchy: Import and integrate all discipline models into a single, coordinated model using BIM software like Autodesk Navisworks, Revit, or similar. Check and align the models spatially to ensure they fit together correctly within the project site. There is a certain hierarchy of systems that occur chronologically one after another during the construction of the building. This hierarchy ranks and considers the most complicated or expensive to move before those that have the greatest freedom of movement. These ranks vary on a project-to-project basis.

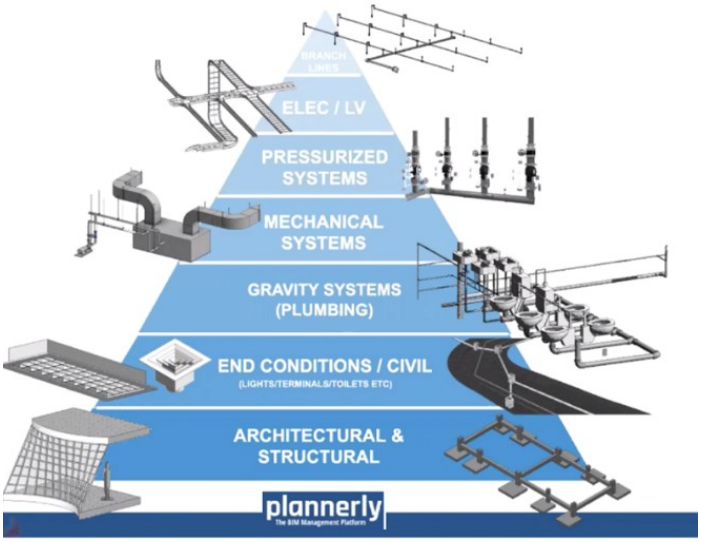

Figure 9: Building system hierarchy (Adapted from (Plannerly))

Define Clash Rules: Set up clash detection rules based on project requirements (e.g., allowable tolerances, and specific elements to be checked). The clash matrix is developed (as shown in Figure 10) with a focus on areas where clashes are most likely to occur, such as intersections of different systems (e.g., HVAC ducts passing through structural beams).

CLASH MATRIX					
	ARCHITECTURAL	STRUCTURAL	HVAC	PLUMBING	ELECTRICAL
ARCHITECTURAL	1	3	5	10	12
STRUCTURAL		2	6	8	13
HVAC			4	9	14
PLUMBING				7	15
ELECTRICAL					11

Figure 10: Sample clash matrix (Adapted from (BIM Corner))

Perform Clash Analysis and Generate Clash Reports: Use clash detection software to

identify potential conflicts between different models. Create detailed reports listing all detected clashes, including their locations and involved elements.

Review Clashes: Analyze clash reports with the project team, including architects, engineers, and contractors, to understand the nature and impact of each clash. Prioritize clashes based on their severity and potential impact on the project timeline and budget.

Develop Solutions and Update Model: Propose and implement solutions to resolve identified clashes. This may involve redesigning certain elements, adjusting installations, or changing construction sequences. Modify the affected models to reflect the resolved clashes.

Verify Model Resolutions and Continuous Monitoring: After resolving clashes, re-run the clash detection process to ensure that all conflicts have been addressed and no new clashes have been introduced. Establish a routine clash detection schedule to catch any new clashes that may arise as the design evolves.

3.3 Methodology Nomenclature and Definitions

Definitions in BIM coordination are essential for effective communication and understanding among stakeholders involved in BIM projects. According to (Sadeh et al., 2022), BIM managers are responsible for overseeing the creation, production, and implementation of BIM plans and protocols, while BIM coordinators facilitate the exchange of models and information under the supervision of BIM managers.

BIM clash detection involves identifying conflicts between building elements in a 3D model, filtering out irrelevant clashes, the role of BIM coordinators in clash management, and the

benefits of clash detection in enhancing project outcomes and coordination in construction projects. (Matejka & Sabart, 2018) categorize clashes based on specific characteristics and detection algorithms. Hard clashes are geometrically oriented, soft clashes involve a static buffer

3.3.1 Clash types

Clash detection is an essential procedure in BIM coordination that finds and fixes conflicts between various building systems before the start of construction. In BIM clash detection, there are several types of clashes, however, the most important types which are (hard clash, clearance, containment and duplicate) will be discussed in this research. The other clashes are usually functional and operational related. Figure 11 illustrates the various types of clashes.

Hard Clash**:** When two or more physical components of a building or infrastructure collide with one another and cannot cohabit in the same space in the actual world, this is referred to as a "hard clash." Some examples of hard clashes: plumbing pipes crossing over into structural beams; HVAC (heating, ventilation and air conditioning) ducts crossing over into walls or other elements, etc.

Clearance Clash: Clearance clash sometimes called soft clash refers to the intersection or overlapping of two or more elements that might not impact the physical appearance of a built environment but that does not mean that the soft clashes can be left as they are. They need to be resolved with proper planning and modification to achieve the best possible results. An example is when there is spatial proximity or when two or more elements are not allowed geometric tolerances. As a result, difficulties may arise when serving HVAC units.

Containment Clash: Containment clash finds all elements within the room, space, or any other container element. Boundary elements often define this. BIM model elements can be enriched with containment relations, and created relations can be viewed and fine-tuned.

Duplicate Clash: Duplicate clash occurs if more than one element is overlapping in the same position. This cannot detected with just observation. This function checks if there are duplicate elements in the 3D model. This usually occurs when different sub-models are combined in the authoring tool in which the project was originally built.

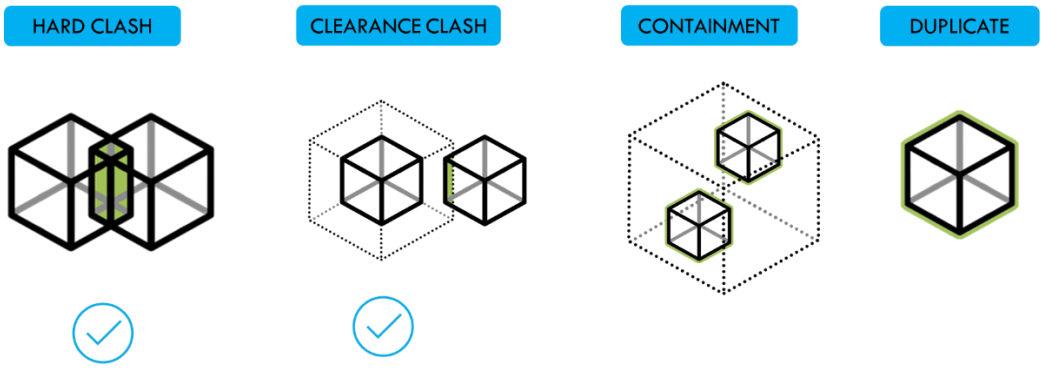

Figure 11: Types of Clashes

3.3.2 Clash Labels

The clashes in this research were labelled for the machine learning training process. The clashes were categorized into three; serious, irrelevant clashes and legal penetration as shown in Figure 12. This was done to simplify the labelling process as thousands of clashes were labelled. The clash labels are described below.

Serious Clash

In BIM coordination, a serious clash is often referred to as a "hard clash," This type of clash can lead to significant issues during construction, such as delays, increased costs, and structural problems. About 20% of the labelled clashes fall in this category. This labelled the clashes that will be considered during coordination meetings

Irrelevant Clash

An irrelevant clash, often referred to as a non-critical clash, occurs when two or more building elements intersect in a way that does not affect the constructability or functionality of the design. These clashes do not require immediate action or significant redesign and are usually minor or expected due to the nature of the elements involved. Examples of irrelevant clashes include Tolerance Overlaps, Shared Space Allowances, and Temporary Clashes. Identifying and categorizing irrelevant clashes helps project teams focus on resolving serious, constructability-impacting clashes, streamlining the coordination process and improving overall project efficiency.

Legal Penetration

A legal clash, also known as a "permitted clash" or "penetration," occurs when building elements intersect in a manner that is intentional and necessary for the design and does not cause issues with constructability or functionality. These penetrations are usually planned and accounted for in construction documents. Examples of legal clashes or penetrations include Service Penetrations, Structural Openings.

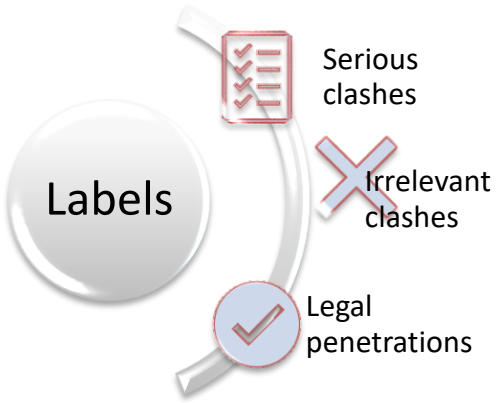

Figure 12: Research ML clash labels

3.4 BIM Clash Detection Process

The BIM models from multiple disciplines were imported into Revit to generate the federated model as part of the clash detection process. This integration allows for the identification of clashes between different building components. Figure 13 illustrates the steps taken in the clash detection process.

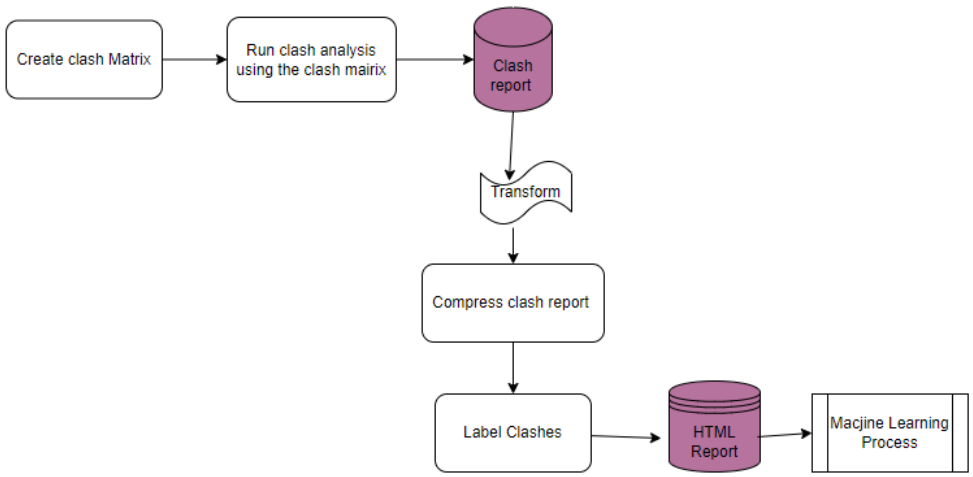

Figure 13: Clash detection process

Using Autodesk Navisworks, the clash detection technique finds where the independent models clash with one another. It does this by examining the areas where model elements from different architect and engineering design disciplines overlap. Clash detection makes sure everything fits together and nothing is incompatible.

The computerized BIM process evaluates a large number of federated models simultaneously, in contrast to the conventional design process, which would involve overlapping designs made on tracing paper. This makes it simpler for BIM, structural, and MEP coordination to integrate all the design data into a master model. When all other models are merged into one entity, architects and designers can use automatic integration to find and evaluate every occurrence of clash in their model.

The breakdown of larger models into subgroups for targeted clash detection is made simpler for architects and building designers by advanced clash detection and design review software like Bexel Manger, and Navisworks.

3.4.1 Research Data Set

The data set used for this research was obtained from numerous clash reports mainly considering clashes with MEP (mechanical, electrical and plumbing) systems from four BIM projects. The dataset from clash detection analysis typically includes detailed information about each identified clash. This dataset helps project teams understand and resolve conflicts and is used for the ML process. The key elements of a clash detection dataset usually include Clash ID, Coordinates, Clash Type etc.

3.5 Process for Using Navisworks to Create a Clash Report

Step 1: When using Autodesk's Navisworks, a clash report is always generated between two design models. The Navisworks program was used to upload the first discipline's existing design model. Any two design models can be selected in order to produce potential clashes between them in the coordinated model.

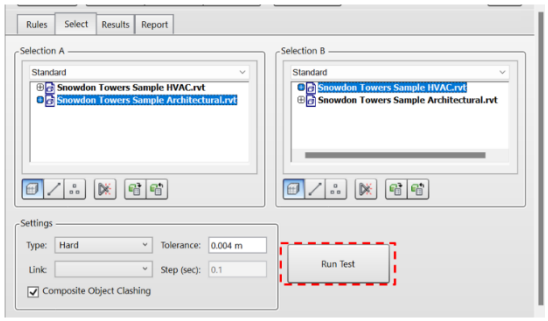

Figure 14: Clash detection process step 1, load first model

Step 2: We must load the second design model and coordinate it with the first independent model in the second step. For the purpose of the following clash detection method, these 2 separate models are combined into one model.

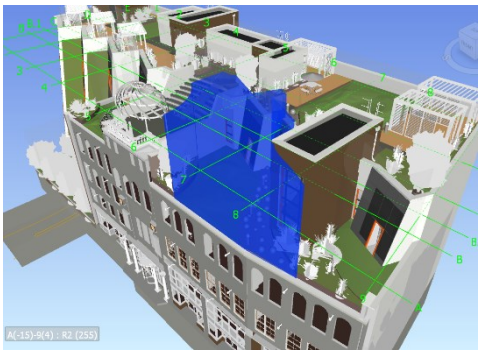

Figure 15: Clash detection process step 2, uploading the second model in Navisworks

Step 3: The next step is to select these two models from the loaded models and begin the clash detection procedure. running the clash test and naming this report.

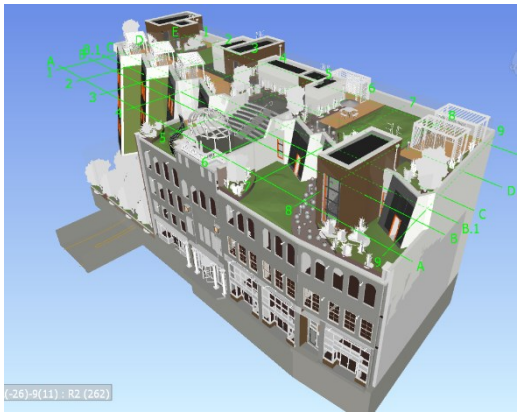

Figure 16: Clash detection process step 3, select the models to run test

Step 4: Following the scan, the system provides us with a list of all potential clashes between those models also with status information, descriptions, and conditions classified by level. When running the test again after a design change, it is important to know whether it is new, active, approved, or resolved.

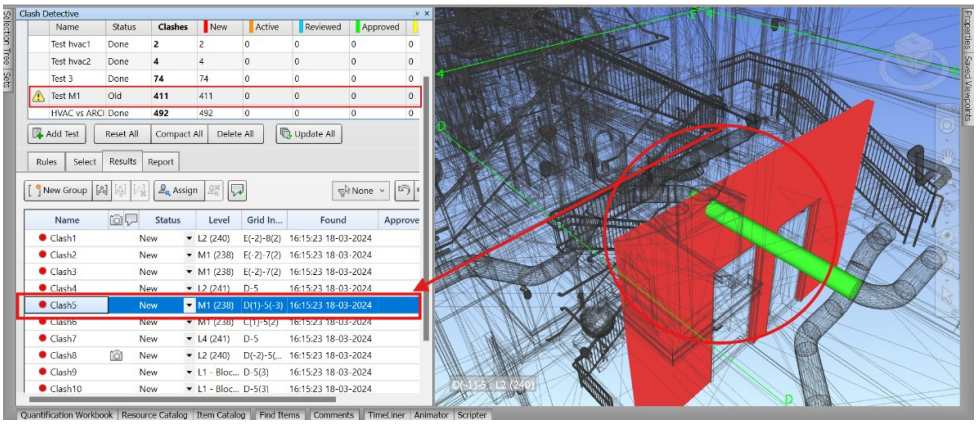

Figure 17: Clash detection process step 4, report will show the possible design clashes

Step 5: This procedure allows us to choose every detail we want to include in the Clash Report at the end. The report's format can be selected from the available alternatives, such as HTML, PDF, etc. By selecting "Write Report," we can build a clash report that will demonstrate the differences between the two designs in detail and with individual images.

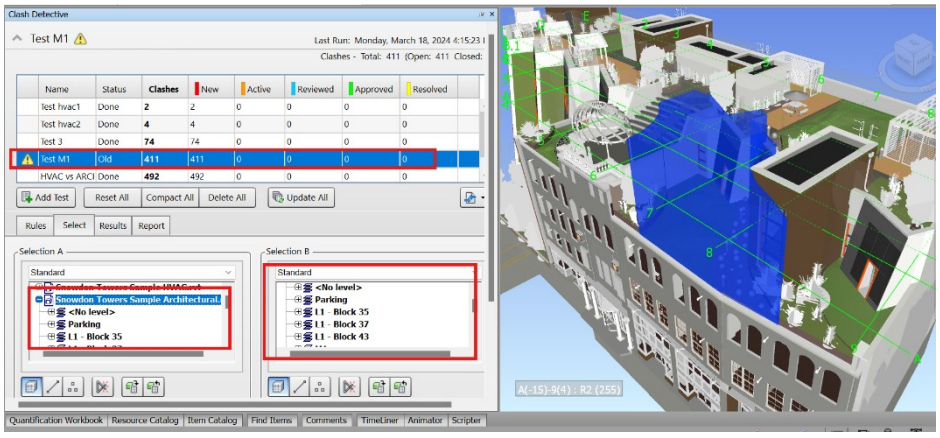

Figure 18: Clash detection process step 5, select preferred details and generate clash report

3.5.1 Clash Data from Bexel Manager

Analyzing clash detection data involves several steps to ensure that all identified clashes are reviewed, prioritized, and resolved efficiently. The results from Bexel Manager were mostly textual data and it was used for the non-geometric clash data analysis. Figure 19 illustrates the Bexel interface with the clash information.

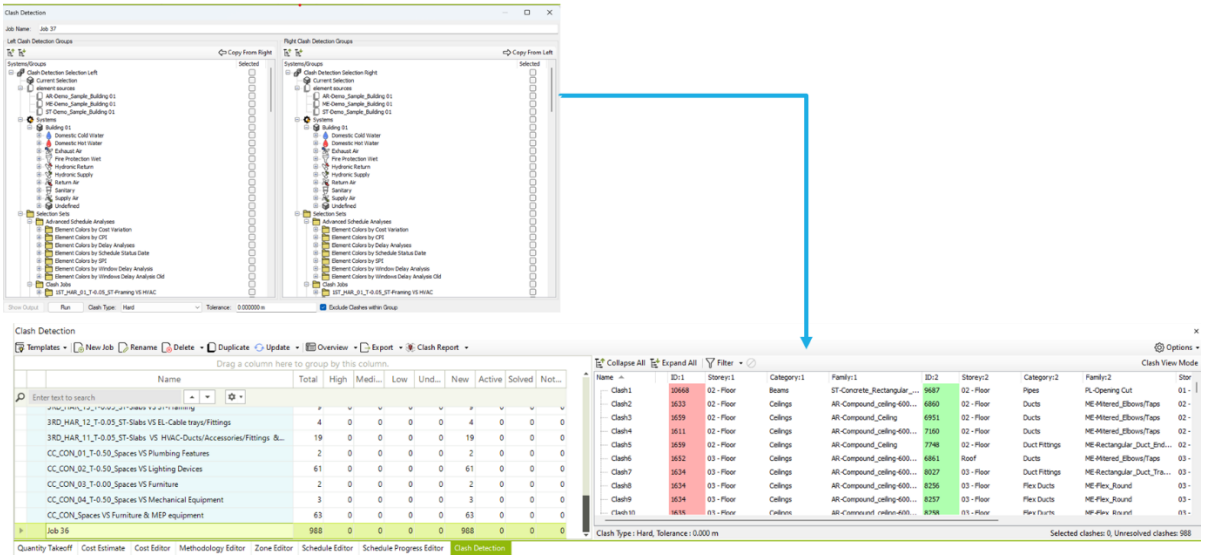

Figure 19: Bexel Clash Report

3.5.2 Clash Data from Navisworks

Navisworks is a popular software used in the construction industry for clash detection and coordination. When clash detection analysis is done in the Navisworks environment, it generates detailed data about each clash, which can be exported and analyzed in different formats. Individual clash images can also be reported from Navisworks. This gives an edge to Navisworks over Bexel manager. Figure 20 illustrates the Navisworks interface with the clash information after running a clash test.

The images exported from Navisworks were used to train the ML algorithm. The dataset utilized in this study comprises the images extracted from diverse clash detection reports. The rationale behind this choice is to evaluate the algorithm's precision across a range of projects and to construct an algorithm with applicability across various project contexts.

Navisworks generates a folder with the pictures of each clash concurrently with the exportation of the HTML tabular report format. This folder serves as the foundational component of the dataset utilized in this study. After the extraction from the HTML tabular reports, specific images featuring Ducts or pipes are categorized and archived in a New folder. The remaining images will be designated as the Test dataset, which comprises various clashes involving both structural elements and MEP elements.

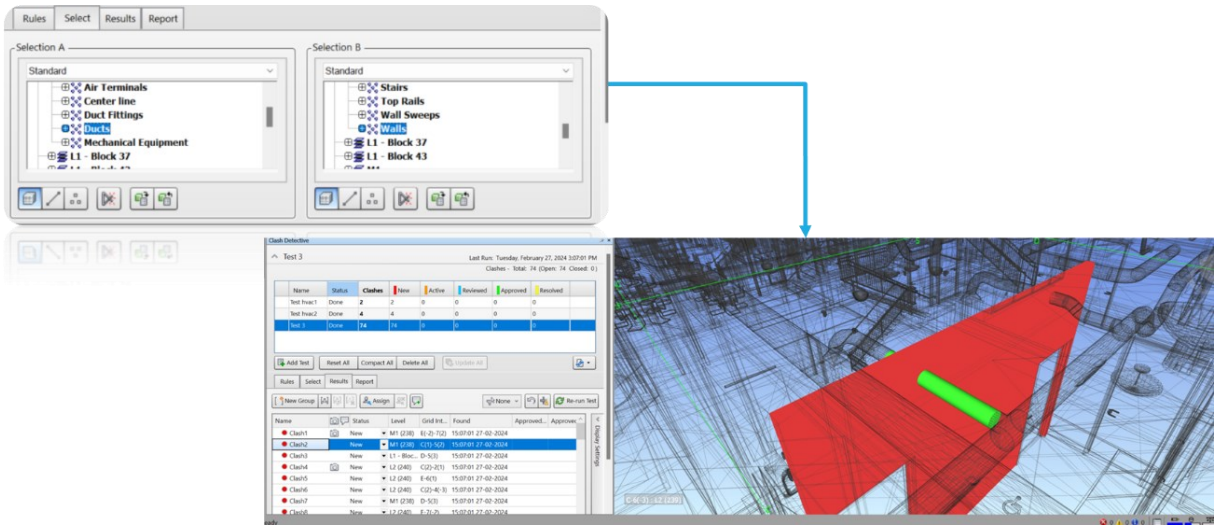

Figure 20: Navisworks interface clash information.

3.6 Machine Learning Process (Two Approach)

The process of machine learning classification contains several steps: problem identification, data set collection, data preparation and preprocessing, algorithm selection, model training, and evaluation(Kotsiantis et al., 2006) . The machine learning process used for this study is illustrated in Figure 21.

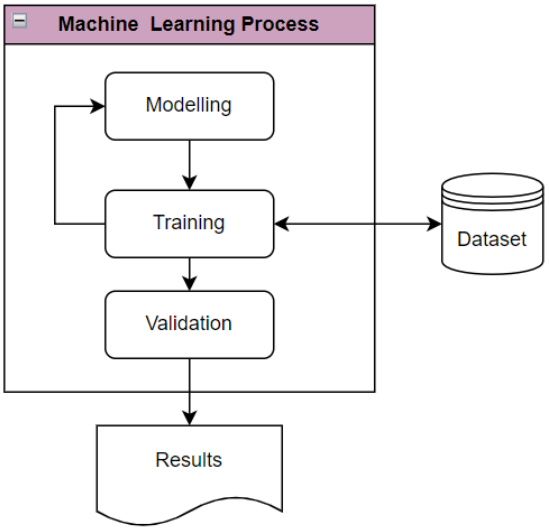

Figure 21: Research ML Process

To develop a machine learning algorithm, several key steps need to be followed. Drawing insights from previous research, the process is summarized as follows:

1. Data Collection and Preprocessing: The first step involves collecting relevant data and preprocessing it to ensure it is clean, structured, and ready for analysis (Sibiya & Didam Markus, 2022). This includes handling missing values, encoding categorical variables, and scaling numerical features. For this research, this was the clean and structured clash reports.

2. Model Selection: An appropriate machine learning algorithm based on the nature of the problem (clash reports) and the dataset. Consider factors such as the type of data, the size of the dataset, and the desired outcome (Rosalina, 2019).

3. Model Training: Train the selected machine learning model on the prepared dataset. This involves feeding the algorithm with the input data and the corresponding output labels to learn the underlying patterns (Santana et al., 2020).

4. Model Evaluation: Assess the model's performance using appropriate evaluation metrics such as accuracy, precision, recall, or F1 score. This step helps determine how well the model generalizes to new, unseen data (Latif et al., 2022).

5. Deployment and Monitoring: Once the model is trained and evaluated, deploy it in a production environment. Monitor the model's performance over time and retrain it periodically to ensure it remains accurate and up to date (Udupi et al., 2023)

3.6.1 ML Non-geometric data process

The textual data exported from the Bexel Manager software is cleaned and labelled as shown in the figure below. More information on the sample exported data is shown in Appendix C.

Name	Globally Unique ID:1	ID:1	Family:1	Category:2	Family:2	Distance	Label	
Clash1	60d7d430-05c3-42a3-9	10668	ST-Concrete_Rectar	Pipes	PL-Opening Cur	0.000 m	Irrelevant	Clashes
Clash2	62c3a09a-b28f-4697-8	1633	AR-Compound_ceili	Ducts	ME-Mitered_El	-0.380 m	Serious	Clashes
Clash3	49728726-7a6a-4de8-b	1659	AR-Compound_Ceil	Ducts	ME-Mitered_El	-0.018 m	Serious	Clashes
Clash4	62c3a09a-b28f-4697-8	1611	AR-Compound_ceili	Ducts	ME-Mitered_El	-0.142 m	Irrelevant	Clashes
Clash5	49728726-7a6a-4de8-b	1659	AR-Compound_Ceil	Duct Fittings	ME-Rectangula	-0.018 m	Legal	Clashes
Clash6	62c3a09a-b28f-4697-8	1652	AR-Compound_ceili	Ducts	ME-Mitered_El	-0.649 m	Serious	Clashes
Clash7	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Duct Fittings	ME-Rectangula	-0.065 m	Irrelevant	Clashes
Clash8	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.011 m	Legal	Clashes
Clash9	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.011 m	Legal	Clashes
Clash10	62c3a09a-b28f-4697-8	1635	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash11	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash12	62c3a09a-b28f-4697-8	1636	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash13	62c3a09a-b28f-4697-8	1636	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash14	62c3a09a-b28f-4697-8	1637	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash15	62c3a09a-b28f-4697-8	1637	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.011 m	Irrelevant	Clashes
Clash16	62c3a09a-b28f-4697-8	1637	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.011 m	Irrelevant	Clashes
Clash17	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash18	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.011 m	Irrelevant	Clashes
Clash19	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.011 m	Irrelevant	Clashes
Clash20	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash21	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash22	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash23	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.018 m	Irrelevant	Clashes
Clash24	62c3a09a-b28f-4697-8	1640	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash25	62c3a09a-b28f-4697-8	1640	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.013 m	Irrelevant	Clashes
Clash26	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.011 m	Irrelevant	Clashes
Clash27	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash28	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash29	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.011 m	Irrelevant	Clashes
Clash30	62c3a09a-b28f-4697-8	1641	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes
Clash31	62c3a09a-b28f-4697-8	1641	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.011 m	Irrelevant	Clashes
Clash32	62c3a09a-b28f-4697-8	1641	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.011 m	Irrelevant	Clashes
Clash33	62c3a09a-b28f-4697-8	1641	AR-Compound_ceili	Flex Ducts	ME-Flex_Rounc	-0.010 m	Irrelevant	Clashes

Figure 22: Cleaned and Sorted Non-Geometric Data

The cleaned data was then imported into the RapidMiner (RapidMiner provides data mining and machine learning procedures) environment. The was cross-validated using multiple classifiers such as (KNN, Naïve Bayes, Random forest etc.). This was done to check for model predictability.

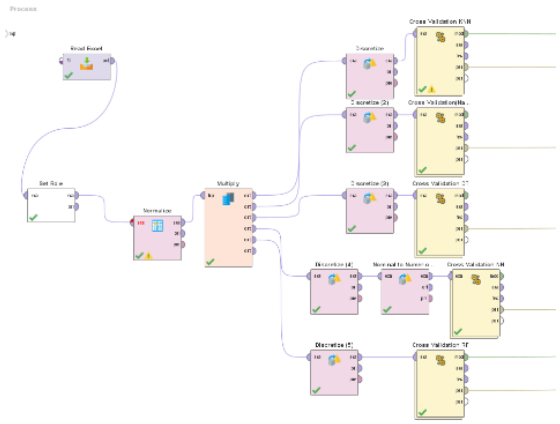

Figure 23: RapidMiner Environment and the connected nodes

3.6.2 ML Image Analysis

The images from the clash report were analyzed using Roboflow. Roboflow provides a cloud-based environment for developers to build their own computer vision applications. Roboflow is a centralized management tool for datasets, enabling users to deploy their model and scale it as data collection progresses. It allows for identifying additional objects, adjusting configurations, and exploring various labelling and training services. The image ML process is as shown below.

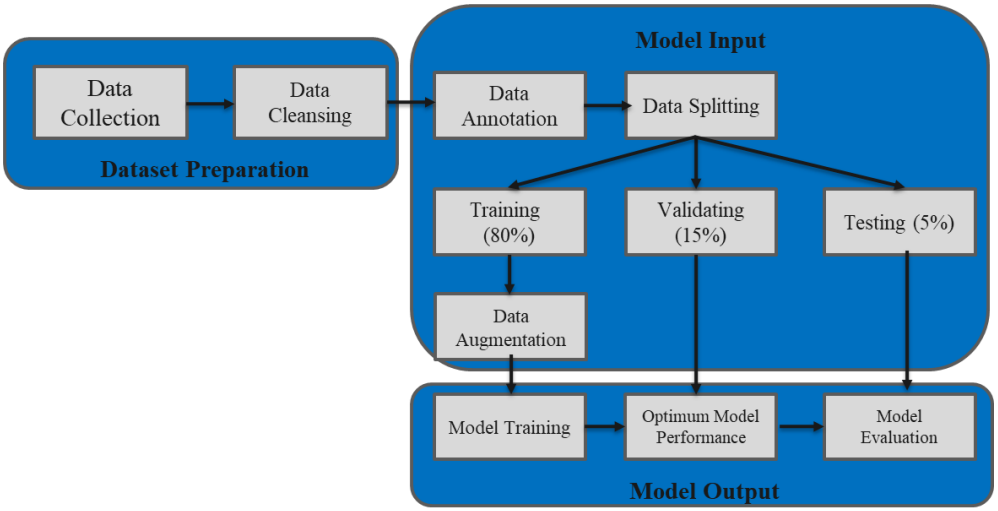

Figure 24: Image Machine Learning Process

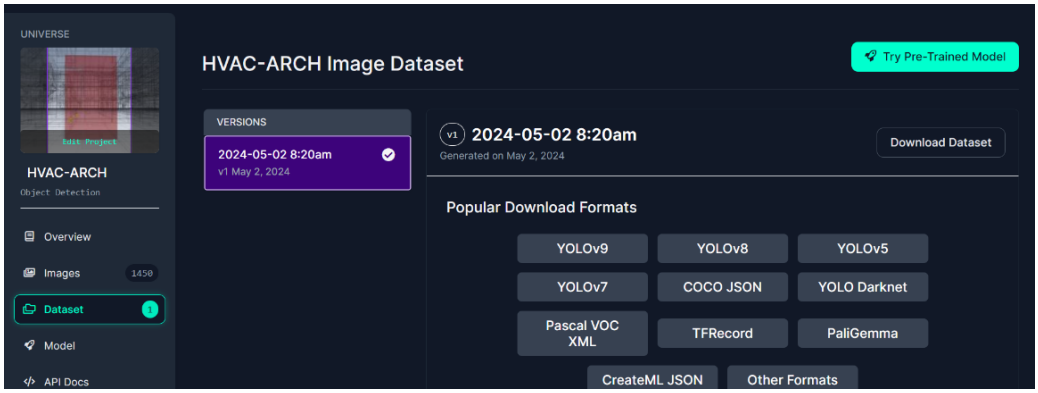

Figure 25: Yolov8 User Interface

Using Roboflow's implementation of YOLOv8 the following steps were taken, from data preparation to model training and deployment. When working with datasets the first step is to upload, then manage, annotate and analyze images. These steps are described below.

Upload Images and Annotate Images: Upload the images you want to use for training. Roboflow supports various formats. Use Roboflow's annotation tool to label the objects in your images. If the dataset is already annotated, you can upload the annotations in supported formats (e.g., COCO, Pascal VOC).

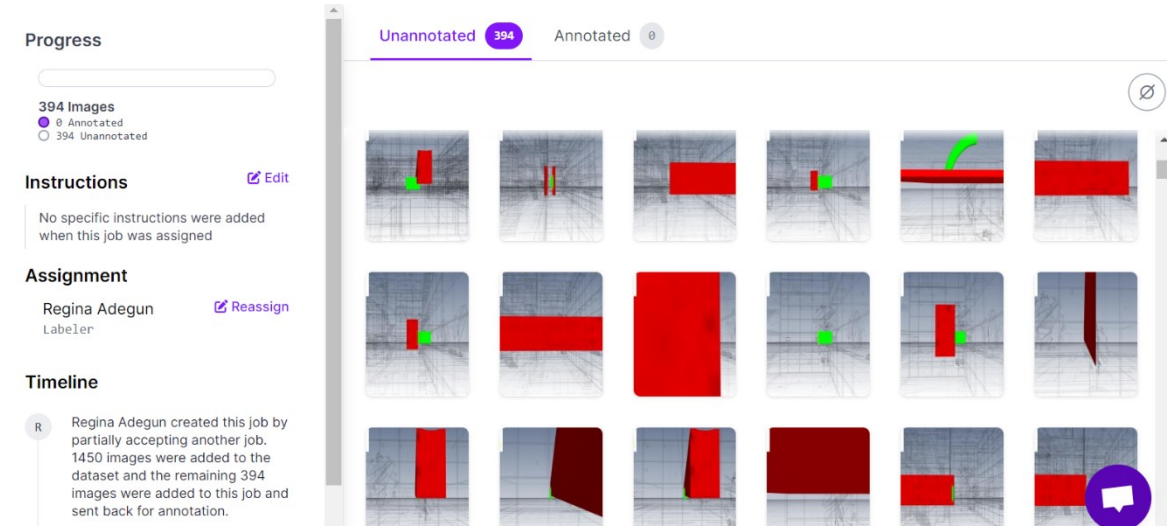

Figure 26: Yolov8 Annotation Interface

Preprocess Data: Roboflow provides preprocessing tools like image resizing, augmentation, and splitting the dataset into training, validation, and testing sets. Configure these settings according to your needs. Train the Model using the YOLOv8 training script to train the model on the prepared dataset. You can specify various parameters like the number of epochs, batch size, and learning rate.

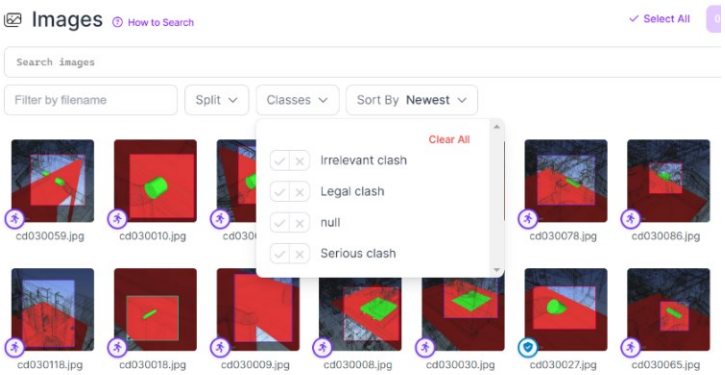

Figure 27: Yolov8 Data Preprocessing Interface

Monitor Performance, Iterate and Improve: Continuously monitor the performance of the deployed model. Using metrics such as precision, recall, and F1 score to track its effectiveness. Based on the performance, iterate on your model. This might involve collecting more data, fine-tuning the model, or using more advanced techniques.

CHAPTER 4. RESULTS AND DISCUSSION

This chapter introduces the results of the images and non-geometric information analysis. Autodesk Revit was chosen as the main platform for authoring the BIM models for this implementation. Navisworks and Bexel Manager are the software used for clash detection analysis. These reports were then analyzed using RapidMiner and the ML algorithm was developed and monitored by Roboflow's Yolov8.

4.1 ML Classification Algorithm

The evolution of machine learning traces its origins back to the mid-20th century, with initial concepts emerging from the field of artificial intelligence (AI). In 1950, Alan Turing proposed the Turing Test to evaluate a machine's ability to exhibit intelligent behaviour. This period saw the development of foundational algorithms, such as the perceptron, introduced by Frank Rosenblatt in 1958, which was an early model for binary classifiers.

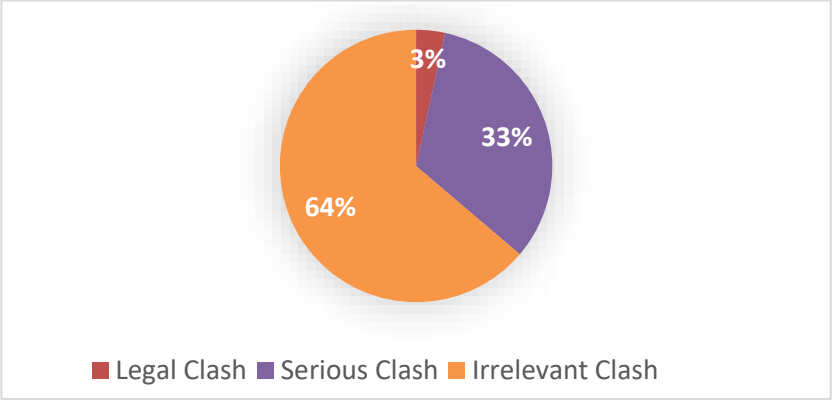

Figure 28: Clash Data Summary

The best practice for choosing a classification algorithm is to compare the performance of several learning algorithms and select the best model for the problem to be solved.

In the 2010s and 2020s, machine learning continued to evolve with the introduction of sophisticated techniques like reinforcement learning, generative adversarial networks (GANs), and transfer learning. The focus also shifted towards making machine learning more accessible through AutoML (Automated Machine Learning) tools, which automate the process of model selection, hyperparameter tuning, and deployment. After the clash reports were cleaned and correctly classified the results show that only approximately

33% of the generated clashes are Serious clashes and 3% are legal penetrations.

Figure 29: Non-geometric data analysis process

4.2 Non- Geometric Data Analysis

The textual data from the clash detection report was labelled and analyzed for data prediction and classification. Some commonly used classification algorithms include Logistic Regression: Suitable for binary classification problems and is easy to implement and interpret. Decision Trees: Provide interpretable models that can handle numerical and categorical data. Random Forests: An ensemble method that improves prediction accuracy and robustness by combining multiple decision trees.

K-Nearest Neighbors (KNN): A simple and intuitive algorithm that performs well with small datasets. Naive Bayes: Suitable for text classification problems and works well with small to medium-sized datasets. Neural Networks: Capable of modelling complex

relationships in data, particularly useful for large datasets and tasks such as image and speech recognition.

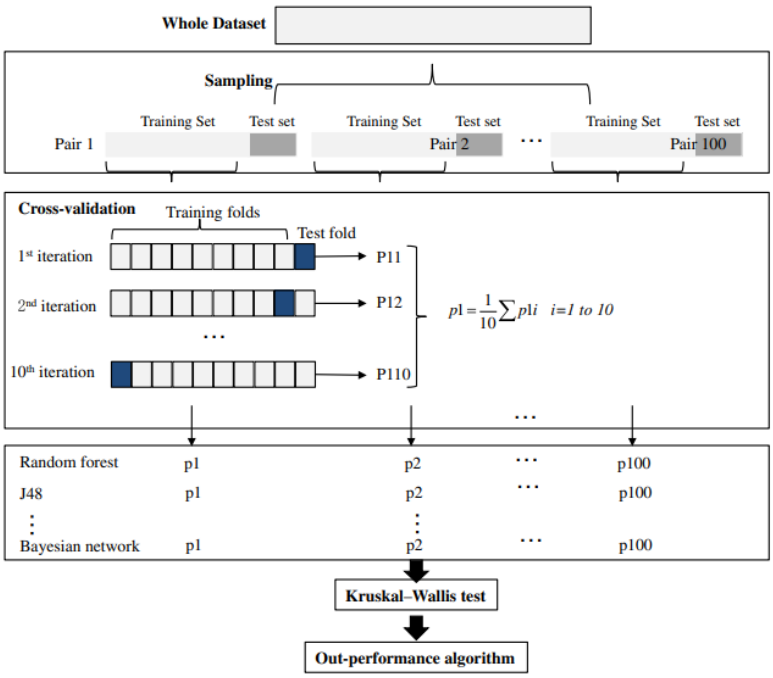

Figure 30: Algorithm selection process adapted from (Kotsiantis 2007)

Selecting the right classification algorithm involves understanding the problem domain, preprocessing data, comparing algorithms, and evaluating model performance. As many machine learning studies suggested, no single classifier can work best across all scenarios. By following best practices, practitioners can build robust and accurate classification models that effectively address real-world problems.

Within the broader realm of machine learning, several distinct types have emerged,

including supervised, unsupervised, semi-supervised, and reinforcement learning (Sarker, 2021). Supervised learning, in particular, has gained significant attention, as it involves the process of training models on labelled datasets comprising input-output pairings. This approach has been successfully applied to classification tasks, where the objective is to assign observations to predefined categories.

Disciplines	**Number of Clashes**
Architectural vs Structural	**678**
Architectural vs HVAC system	**1095**
Structural vs HVAC system	**1380**
Structural vs Plumbing system	**1651**
Architectural vs Plumbing system	**792**
HVAC system vs Plumbing system	**1149**

Table 1: Sample Project Clash Detection Information

4.3 Data Prediction Results

In machine learning, choosing the best-performing classifier depends on the specific problem, dataset, and performance criteria. However, some classifiers are known for their strong performance across a wide range of applications.

The missing values were filtered out, and the data labelled the classification (Serious, Irrelevant and legal clash). The criterion for evaluation is limited to accuracy, root mean square (RMSE) and absolute error to simplify the results. The results for each classification are as follows.

4.3.1 Performance Vector (Neural Networks)

Deep learning models, particularly CNNs and Recurrent Neural Networks (RNNs), have achieved state-of-the-art performance in various tasks, especially in image and speech recognition.

Criterion	Neural Networks
Accuracy	90.28% +/- 0.52% (micro average: 90.28%)
RMSE	0.286 +/- 0.008 (micro average: 0.286 +/- 0.000)
Absolute Error	0.155 +/- 0.008 (micro average: 0.155 +/- 0.241)

Table 2: Neural Networks Results

4.3.2 Performance Vector (Naive Bayes)

Naive Bayes classifiers are probabilistic classifiers based on Bayes' theorem with the assumption of independence between features. They are particularly effective for text classification.

Criterion	Naïve Bayes
Accuracy	91.20% +/- 0.62% (micro average: 91.20%)
RMSE	0.282 +/- 0.007 (micro average: 0.282 +/- 0.000)
Absolute Error	0.151 +/- 0.011 (micro average: 0.151 +/- 0.238)

Table 3: Naïve Bayes Results

4.3.3 Performance Vector (KNN)

k-NN is a simple, non-parametric method used for classification and regression. Despite its simplicity, it can be very effective for certain types of datasets.

Criterion	KNN
Accuracy	89.78% +/- 0.88% (micro average: 89.78%)
RMSE	0.321 +/- 0.019 (micro average: 0.322 +/- 0.000)
Absolute Error	0.166 +/- 0.022 (micro average: 0.166 +/- 0.275)

Table 4: KNN Results

4.3.4 Performance Vector Decision Tree (DT)

Decision Trees are simple yet powerful models that split the data into subsets based on the value of input features. They are easy to interpret and visualize, making them useful for a wide range of applications.

Criterion	Decision Tree
Accuracy	90.28% +/- 0.52% (micro average: 90.28%)
RMSE	0.282 +/- 0.008 (micro average: 0.282 +/- 0.000)
Absolute Error	0.151 +/- 0.011 (micro average: 0.151 +/- 0.238)

Table 5: Decision Tree Results

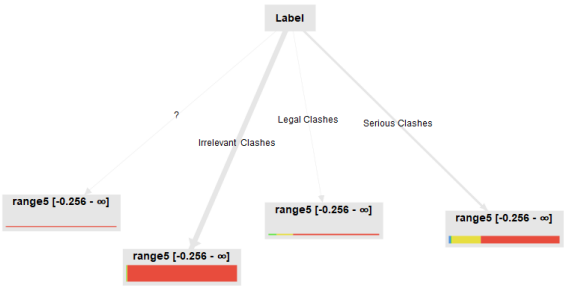

Figure 31: Decision Tree RapidMiner illustration

4.3.5 Performance Vector Random Forest (RF)

Random Forest is an ensemble learning method that operates by constructing multiple decision trees during training and outputting the class that is the mode of the classes (classification) or mean prediction (regression) of the individual trees.

This sample model contains 988 examples with 1 dimension of the following classes:

Label = Irrelevant Clashes: range5 [-0.256 - ∞] {range1 [-∞ - -1.024] =0, range2 [-1.024…

Label = Legal Clashes: range5 [-0.256 - ∞] {range1 [-∞ - -1.024] =0, range2 [-1.024 - -0.768]=0, range3 [-0.768 - -0.512]=2….

Label = Serious Clashes: range5 [-0.256 - ∞] {range1 [-∞ - -1.024]=1, range2 [-1.024 - -

Criterion	**Random Forest**
Accuracy	90.38% +/- 0.52% (micro average: 90.38%)
RMSE	0.282 +/- 0.010 (micro average: 0.283 +/- 0.000)
Absolute Error	0.151 +/- 0.016 (micro average: 0.151 +/- 0.239)

Table 6: Random Forest Results

4.4 Geometric Data Analysis Results

The image analysis was carried out on Roboflow and the results are as follows. The methodology employed for identifying clash images during clash detection is termed YOLO (you-only-look-once), a type of CNN known for its high level of intelligence(Hu & Castro-Lacouture, 2019). Within YOLO, users are required to create a bounding box around the specific element in the designated test image. Subsequently, the image will be annotated with the bounding box and utilized as training data.

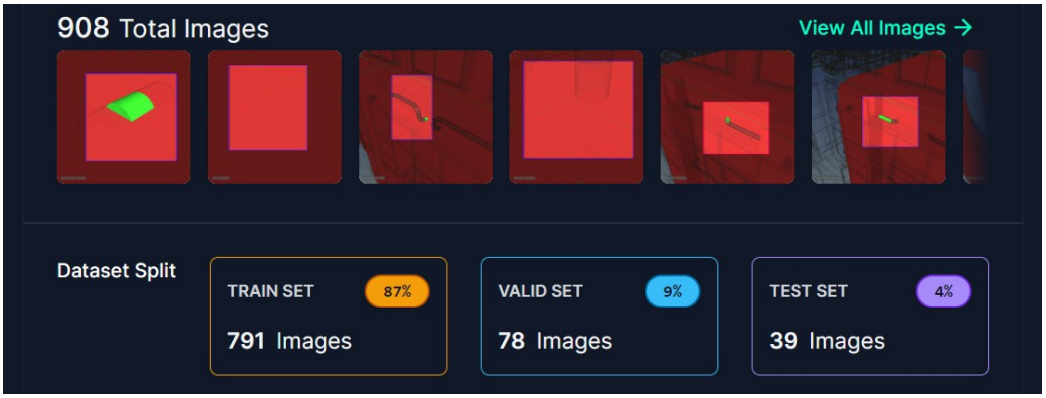

Figure 32: Sample dataset split training, validation and testing

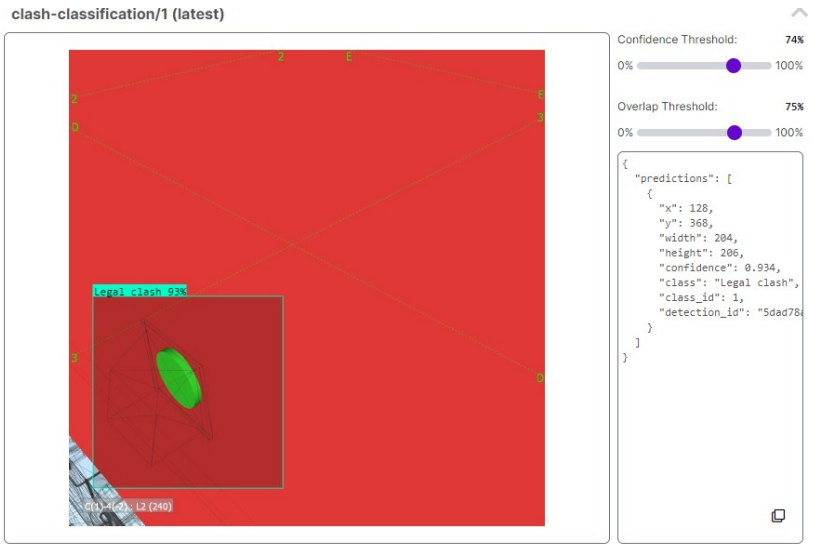

Figure 33: Sample result from ML model

4.4.1 Data Splitting, Preprocessing, and Augmentation:

After labelling the dataset, the dataset was split randomly into three subsets: Training, Validation, and Testing subsets. Based on the dataset size, it was divided as follows: 80% of the data set was used for training the model to identify clash penetrations (around 1640 images), 15% of the dataset was used for validating (831 images) the training step and 5% of the dataset will be used for testing (283 images).

The dataset images were preprocessed by adjusting the size of the image to 640x640 pixels. The training dataset count was multiplied by three after applying two modifications to the original dataset. The first modification was to apply rotation on every image.

The augmentation was to adjust the exposure to allow the model to recognize smaller degrees of penetration. The largest generated dataset will result in an additional 1345 images. The total number of examples in the dataset became 5784 images.

4.4.2 Model Performance

Evaluating the performance of a YOLOv8 model trained using Roboflow involves several key steps, including training the model, validating its performance, and using appropriate metrics to assess its effectiveness.

The YOLO technique is progressively emerging as a prominent instrument for object recognition at construction sites due to its superior performance compared to other models in terms of mean average precision (mAP).

In a study on CNN models utilizing YOLO, (Nath & Behzadan, 2020) determined that YOLO-v3 surpasses YOLO-v2 in detecting smaller and more complex objects. Furthermore, their investigation revealed that models based on YOLO accurately forecast the relative distances of observed objects. Yolo V9 was used for this research

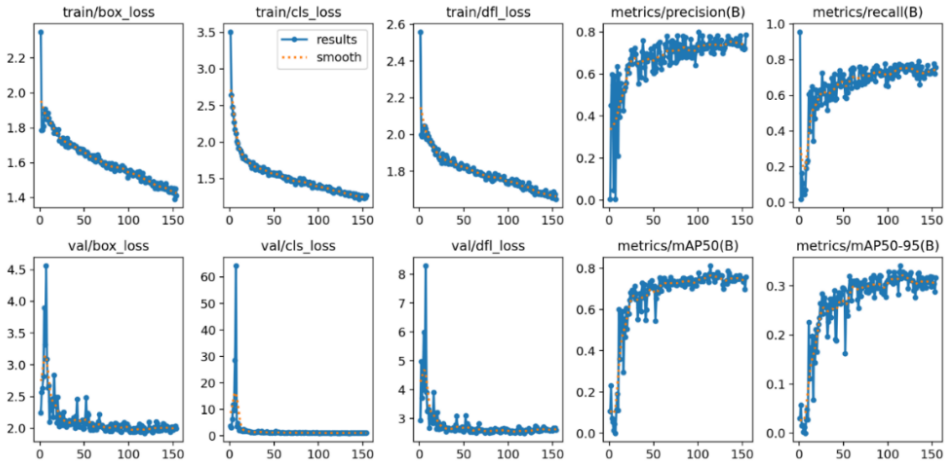

Figure 34: Yolo v8 Dataset health dashboard

The validating dataset was then used to determine the best model based on its performance so that it will be used later for testing. Figure 4-8 shows the performance indices for the trained dataset for each epoch. The recall for the optimum model is found to be 86%.

MAP (mean Average Precision):

MAP is a commonly used metric for object detection models. It represents the average precision across all classes at different intersection-over-union (IOU) thresholds. The mAP for this model is 81.2%.

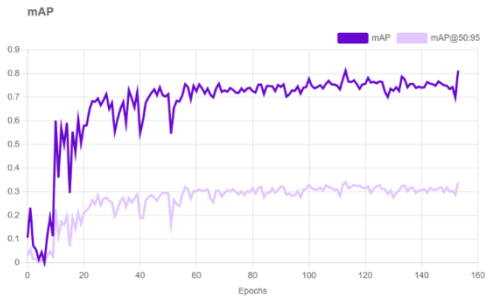

Figure 35: Performance Indices for the training dataset

Precision:

Precision measures the accuracy of the positive predictions. It is the ratio of true positive detections to the total number of positive predictions (true positives + false positives). Overall precision is approximately 79.7%

$$\text{Precision} = \frac{TP}{TP + FP}$$

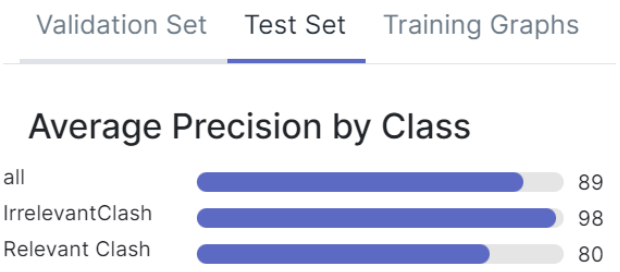

Figure 36: Average model precision by class

Recall:

Recall measures the ability of the model to identify all relevant instances. It is the ratio of true positive detections to the total number of actual positives (true positives + false negatives). Overall recall is approximately 77.1%.

$$\text{Recall} = \frac{TP}{TP + FN}$$

CHAPTER 5. CONCLUSION

5.1 Summary

The benefits of BIM-based model coordination and automated clash detection functionality are numerous in both the design and construction phases of a project. One demonstration of this is its ability to automatically recognize clashes within the model, giving opportunities to rectify these clashes prior to the start of construction tasks.

This results in significant cost savings, a decrease in rework, a reduction in Requests for Information (RFIs), and a decrease in construction-related issues. Despite the high value placed on automated clash detection, the process of correcting clashes during the design phase can be arduous, requiring all involved parties to collectively review a single clash and determine the most suitable resolution. Moreover, contemporary software systems are unreliable in their capability to differentiate between a relevant and irrelevant clash one in real-world scenarios.

This study emphasizes that enhancing clash management procedures can be achieved by automatically differentiating between pertinent and inconsequential clashes, enabling project team members to concentrate on more critical aspects of design evolution and construction.

This research explores machine learning through two main avenues, categorizing clashes by image recognition and numerical data.

The textual data was used to anticipate the significance of clashes, an attribute framework was developed by synthesizing existing literature and conducting interviews with project team members, incorporating factors such as information ambiguity, problem intricacy,

and contextual adaptability. By utilizing cross-validation, multiple classifiers including Neural Networks, KNN, Random Forest, Naïve Bayes, and Decision Tree were evaluated with the best performing being the Naïve Bayes Classification with an accuracy of 91.20%. This outcome signifies the efficacy of the proposed methodology.

The study outlines a methodology for formalizing implicit knowledge from clash data using machine learning techniques, showcasing the potential to distinguish clash detection quality from expert's project experience.

While a model for identifying irrelevant clashes has been developed, its effectiveness is limited by the extent of automation in data collection and dataset size. Given that Building Information Modelling (BIM) functionality, a more automated approach could be employed to extract necessary attribute values from the BIM model, streamlining real-time clash detection.

Despite employing sampling techniques to enhance result reliability and achieving promising outcomes with the current dataset, extensive data analysis could further enhance the accuracy and applicability of the proposed predictive model.

For the image processing machine learning, an algorithm was developed based on the classification feature to identify relevant clashes in clash detection reports by utilizing the image recognition capability of the supervised Convolutional Neural Network (CNN) algorithm.

Moreover, the YOLOv9 algorithm was employed as the platform, algorithm for labelling and training purposes. This algorithm assesses clashes through image analysis rather than

numerical data. The algorithm's precision is contingent upon the quantity and quality of images, or in simpler terms, the dataset size. The current prediction accuracy for image recognition is approximately **87.4%**, which shows only a few clashes are misclassified.

An important advantage of this approach is its applicability across various projects, as it can be utilized to categorize similar clashes in different projects without requiring modifications to the algorithm structure.

To optimize the algorithm's effectiveness, The images were precisely categorized into various relevant, irrelevant and legal clashes, enabling the algorithm to more accurately differentiate between relevant and irrelevant clashes. Moreover, the accuracy of the labelling process, which includes the bounding box and types for each label, plays a crucial role in determining the algorithm's precision.

5.2 Research contributions

The ML algorithm developed in this study holds significant promise for future academic research and current industry practices in BIM coordination. It also represents an initial exploration into the utilization of image recognition algorithms for the classification of relevant and irrelevant clashes.

The primary contributions of this research are summarized as follows:

Time savings on manually checking all clashes: By automating the clash report review process, the need for manual review of clash reports is significantly reduced. This allows

professionals to focus on important clashes rather than sorting through thousands of clashes. The developed algorithms can quickly scan and identify clashes in the BIM model, providing results in a fraction of the time it would take a human to do the same task. This leads to faster project turnaround times.

Improved clash classification accuracy: The results from the clash detection report are consistent and accurate, reducing the risk of human error and omission. This consistency can prevent costly mistakes and rework down the line in a project's life cycle.

Enhanced Collaboration: The developed algorithms can facilitate collaboration among team members. This can streamline communication and ensure that relevant clashes are resolved more efficiently. These results can also be used to make informed decisions on offsite constructability.

Early clash detection and space optimization: By analyzing clash reports, with the developed algorithm in this research designers can optimize the layout and design of building components to minimize wasted space and improve the overall efficiency of the design.

5.3 Limitations and Future Research

From the conclusions drawn in this research and to improve the performance of the proposed methodology, the following directions can be pursued in the future:

Train the machine learning algorithms with more images to expand the scope and accuracy of the clash classification: The presented methodology was only trained with a limited data set that focused more on clashes with Mechanical—Electrical and plumbing (MEP) systems.

Results linked to constructability ranking: This research can be further expanded to be implemented directly on the construction site. This can be done by automatically linking the results of the highlighted relevant clashes to a constructability scale that will be used to make decisions on the construction site.

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APPENDIX A: ML Implementation Code

Uploading a Local Image (.Net)

```
using System;
using System.IO;
using System.Net;
using System.Text;

namespace UploadLocal
{
   class UploadLocal
   {

      static void Main(string[] args)
      {
         byte[] imageArray = System.IO.File.ReadAllBytes(@"YOUR_IMAGE.jpg");
         string encoded = Convert.ToBase64String(imageArray);
         byte[] data = Encoding.ASCII.GetBytes(encoded);
         string API_KEY = "K6rTmp1xDih92DIe3LSt"
         string DATASET_NAME = "hvac-arch"

         // Construct the URL
         string uploadURL =
               "https://api.roboflow.com/dataset/" +
                     DATASET_NAME + "/upload" +
                     "?api_key=" + API_KEY +
                     "&name=YOUR_IMAGE.jpg" +
                     "&split=train";

         // Service Request Config
         ServicePointManager.Expect100Continue = true;
         ServicePointManager.SecurityProtocol = SecurityProtocolType.Tls12;

         // Configure Request
```

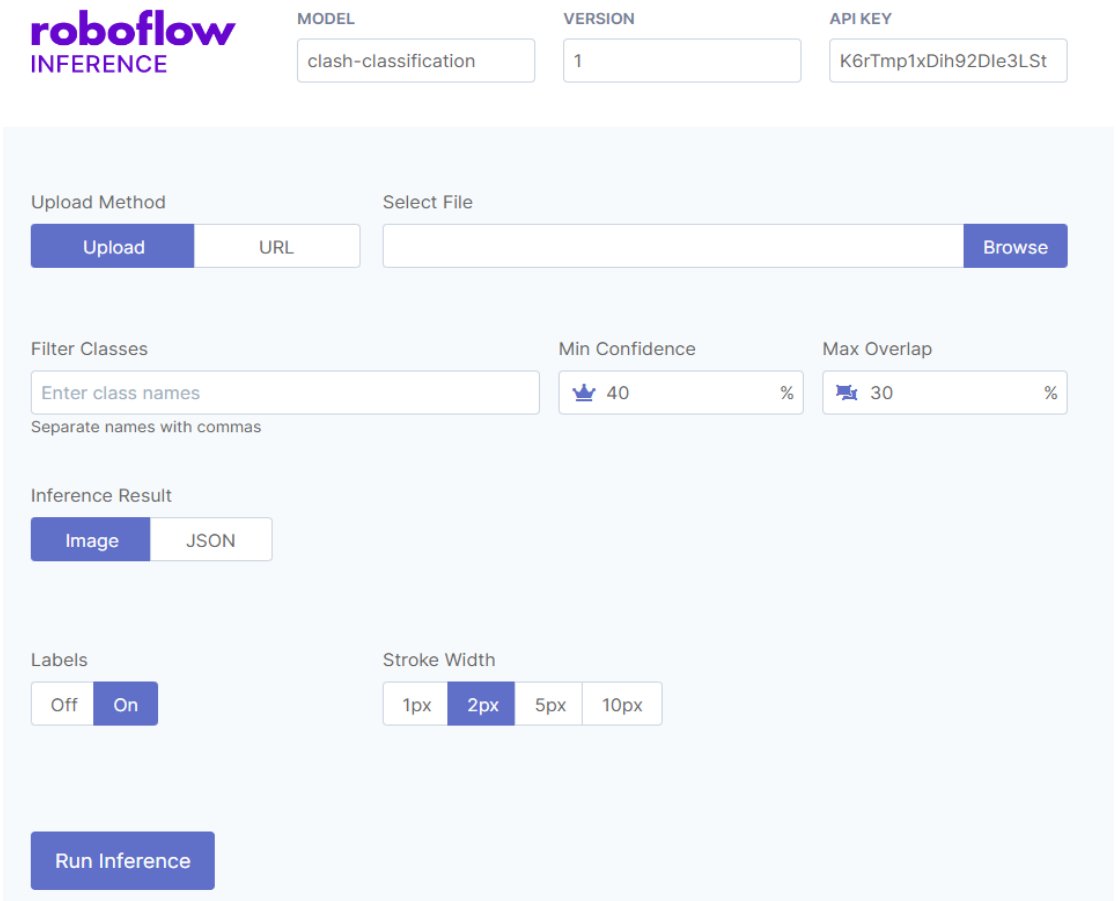
```
        WebRequest request = WebRequest.Create(uploadURL);
        request.Method = "POST";
        request.ContentType = "application/x-www-form-urlencoded";
        request.ContentLength = data.Length;

        // Write Data
        using (Stream stream = request.GetRequestStream())
        {
            stream.Write(data, 0, data.Length);
        }

        // Get Response
        string responseContent = null;
        using (WebResponse response = request.GetResponse())
        {
            using (Stream stream = response.GetResponseStream())
            {
                using (StreamReader sr99 = new StreamReader(stream))
                {
                    responseContent = sr99.ReadToEnd();
```

Inferring a Local Image (.Net)

```
using System;
using System.IO;
using System.Net;
using System.Text;

namespace InferenceLocal
{
    class InferenceLocal
    {

        static void Main(string[] args)
        {
            byte[] imageArray = System.IO.File.ReadAllBytes(@"YOUR_IMAGE.jpg");
            string encoded = Convert.ToBase64String(imageArray);
            byte[] data = Encoding.ASCII.GetBytes(encoded);
            string API_KEY = "K6rTmp1xDih92DIe3LSt"
            string DATASET_NAME = "hvac-arch"
```

```
        string DATASET_VERSION = "1"

        // Construct the URL
        string uploadURL =
            "https://detect.roboflow.com/" + DATASET_NAME + "/" +
DATASET_VERSION + "?api_key=" + API_KEY
            + "&name=YOUR_IMAGE.jpg";

        // Service Request Config
        ServicePointManager.Expect100Continue = true;
        ServicePointManager.SecurityProtocol = SecurityProtocolType.Tls12;

        // Configure Request
        WebRequest request = WebRequest.Create(uploadURL);
        request.Method = "POST";
        request.ContentType = "application/x-www-form-urlencoded";
        request.ContentLength = data.Length;

        // Write Data
        using (Stream stream = request.GetRequestStream())
        {
            stream.Write(data, 0, data.Length);
        }

        // Get Response
        string responseContent = null;
        using (WebResponse response = request.GetResponse())
        {
            using (Stream stream = response.GetResponseStream())
            {
                using (StreamReader sr99 = new StreamReader(stream))
                {
                    responseContent = sr99.ReadToEnd();
                }




        Console.WriteLine(responseContent);
```

APPENDIX B: WEB INTERFACE



APPENDIX C: LABELLED CLASH REPORT

Name	Globally Unique ID:1	ID:1	Family:1	Category:2	Family:2	Distance	Label
Clash1	60d7d430-05c3-42a3-9	10668	ST-Concrete_Recta	Pipes	PL-Opening Cu	0.000 m	Irrelevant Clashes
Clash2	62c3a09a-b28f-4697-8	1633	AR-Compound_ceili	Ducts	ME-Mitered_E	-0.380 m	Serious Clashes
Clash3	49728726-7a6a-4de8-b	1659	AR-Compound_Ceil	Ducts	ME-Mitered_E	-0.018 m	Serious Clashes
Clash4	62c3a09a-b28f-4697-8	1611	AR-Compound_ceili	Ducts	ME-Mitered_E	-0.142 m	Irrelevant Clashes
Clash5	49728726-7a6a-4de8-b	1659	AR-Compound_Ceil	Duct Fittings	ME-Rectangular	-0.018 m	Legal Clashes
Clash6	62c3a09a-b28f-4697-8	1652	AR-Compound_ceili	Ducts	ME-Mitered_E	-0.649 m	Serious Clashes
Clash7	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Duct Fittings	ME-Rectangula	-0.065 m	Irrelevant Clashes
Clash8	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m	Legal Clashes
Clash9	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m	Legal Clashes
Clash10	62c3a09a-b28f-4697-8	1635	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash11	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash12	62c3a09a-b28f-4697-8	1636	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash13	62c3a09a-b28f-4697-8	1636	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash14	62c3a09a-b28f-4697-8	1637	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash15	62c3a09a-b28f-4697-8	1637	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m	Irrelevant Clashes
Clash16	62c3a09a-b28f-4697-8	1637	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m	Irrelevant Clashes
Clash17	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash18	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m	Irrelevant Clashes
Clash19	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m	Irrelevant Clashes
Clash20	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash21	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash22	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash23	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.018 m	Irrelevant Clashes
Clash24	62c3a09a-b28f-4697-8	1640	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash25	62c3a09a-b28f-4697-8	1640	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m	Irrelevant Clashes
Clash26	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m	Irrelevant Clashes
Clash27	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash28	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m	Irrelevant Clashes
Clash29	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m	Irrelevant Clashes

Clash34	62c3a09a-b28f-4697-8	1642	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash35	62c3a09a-b28f-4697-8	1642	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash36	62c3a09a-b28f-4697-8	1642	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash37	62c3a09a-b28f-4697-8	1642	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash38	62c3a09a-b28f-4697-8	1643	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash39	62c3a09a-b28f-4697-8	1643	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash40	62c3a09a-b28f-4697-8	1643	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash41	62c3a09a-b28f-4697-8	1643	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash42	62c3a09a-b28f-4697-8	1645	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash43	62c3a09a-b28f-4697-8	1644	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash44	62c3a09a-b28f-4697-8	1648	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash45	62c3a09a-b28f-4697-8	1648	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash46	62c3a09a-b28f-4697-8	1648	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash47	62c3a09a-b28f-4697-8	1648	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash48	62c3a09a-b28f-4697-8	1649	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash49	62c3a09a-b28f-4697-8	1649	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash50	62c3a09a-b28f-4697-8	1649	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash51	62c3a09a-b28f-4697-8	1649	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash52	62c3a09a-b28f-4697-8	1650	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash53	62c3a09a-b28f-4697-8	1650	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash54	62c3a09a-b28f-4697-8	1650	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash55	62c3a09a-b28f-4697-8	1650	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash56	62c3a09a-b28f-4697-8	1651	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash57	62c3a09a-b28f-4697-8	1651	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash58	62c3a09a-b28f-4697-8	1651	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash59	62c3a09a-b28f-4697-8	1651	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash60	62c3a09a-b28f-4697-8	1652	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash61	62c3a09a-b28f-4697-8	1652	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash62	62c3a09a-b28f-4697-8	1652	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.010 m Irrelevant Clashes
Clash63	62c3a09a-b28f-4697-8	1652	AR-Compound_ceili	Flex Ducts	ME-Flex_Roun	-0.011 m Irrelevant Clashes
Clash64	9e343347-e3b6-48ba-8	10542	ST-Concrete_Round	Ducts	ME-Mitered_E	-0.033 m Serious Clashes
Clash65	9e343347-e3b6-48ba-8	10499	ST-Concrete_Round	Ducts	ME-Mitered_E	-0.045 m Serious Clashes
Clash66	9e343347-e3b6-48ba-8	10504	ST-Concrete_Round	Duct Fittings	ME-Rectangula	-0.011 m Irrelevant Clashes

Clash68	9e343347-e3b6-48ba-8	10510	ST-Concrete_Round Ducts	ME-Mitered_E	-0.016 m	Irrelevant Clashes
Clash69	9e343347-e3b6-48ba-8	10511	ST-Concrete_Round Ducts	ME-Mitered_E	-0.016 m	Irrelevant Clashes
Clash70	9e343347-e3b6-48ba-8	10512	ST-Concrete_Round Ducts	ME-Mitered_E	-0.009 m	Irrelevant Clashes
Clash71	9e343347-e3b6-48ba-8	10513	ST-Concrete_Round Ducts	ME-Mitered_E	-0.016 m	Irrelevant Clashes
Clash72	9e343347-e3b6-48ba-8	10514	ST-Concrete_Round Ducts	ME-Mitered_E	-0.016 m	Serious Clashes
Clash73	9e343347-e3b6-48ba-8	10515	ST-Concrete_Round Ducts	ME-Mitered_E	-0.016 m	Irrelevant Clashes
Clash74	9e343347-e3b6-48ba-8	10515	ST-Concrete_Round Ducts	ME-Mitered_E	-0.009 m	Irrelevant Clashes
Clash75	9e343347-e3b6-48ba-8	10516	ST-Concrete_Round Ducts	ME-Mitered_E	-0.206 m	Serious Clashes
Clash76	9e343347-e3b6-48ba-8	10516	ST-Concrete_Round Duct Fittings	ME-Rectangula	-0.099 m	Serious Clashes
Clash77	9e343347-e3b6-48ba-8	10518	ST-Concrete_Round Ducts	ME-Mitered_E	-0.016 m	
Clash78	9e343347-e3b6-48ba-8	10523	ST-Concrete_Round Ducts	ME-Mitered_E	-0.120 m	Serious Clashes
Clash79	48891eaa-9041-405b-a	10368	ST-Concrete_Round Ducts	ME-Mitered_E	-0.069 m	Serious Clashes
Clash80	48891eaa-9041-405b-a	10377	ST-Concrete_Round Ducts	ME-Mitered_E	-0.067 m	Serious Clashes
Clash81	48891eaa-9041-405b-a	10377	ST-Concrete_Round Duct Fittings	ME-Rectangula	-0.033 m	Irrelevant Clashes
Clash82	48891eaa-9041-405b-a	10387	ST-Concrete_Round Ducts	ME-Mitered_E	-0.034 m	Irrelevant Clashes
Clash83	48891eaa-9041-405b-a	10390	ST-Concrete_Round Ducts	ME-Mitered_E	-0.172 m	Serious Clashes
Clash84	48891eaa-9041-405b-a	10391	ST-Concrete_Round Ducts	ME-Mitered_E	-0.059 m	
Clash85	48891eaa-9041-405b-a	10405	ST-Concrete_Round Ducts	ME-Mitered_E	-0.060 m	
Clash86	48891eaa-9041-405b-a	10410	ST-Concrete_Round Ducts	ME-Mitered_E	-0.019 m	Serious Clashes
Clash87	48891eaa-9041-405b-a	10410	ST-Concrete_Round Ducts	ME-Mitered_E	-0.121 m	Serious Clashes
Clash88	48891eaa-9041-405b-a	10410	ST-Concrete_Round Duct Fittings	ME-Rectangula	-0.118 m	Serious Clashes
Clash89	48891eaa-9041-405b-a	10413	ST-Concrete_Round Ducts	ME-Mitered_E	-0.106 m	Serious Clashes
Clash90	9e343347-e3b6-48ba-8	10435	ST-Concrete_Round Flex Ducts	ME-Flex_Roun	-0.021 m	Irrelevant Clashes
Clash91	9e343347-e3b6-48ba-8	10453	ST-Concrete_Round Ducts	ME-Mitered_E	-0.181 m	Serious Clashes
Clash92	9e343347-e3b6-48ba-8	10456	ST-Concrete_Round Ducts	ME-Mitered_E	-0.100 m	Serious Clashes
Clash93	9e343347-e3b6-48ba-8	10460	ST-Concrete_Round Ducts	ME-Mitered_E	-0.059 m	Irrelevant Clashes
Clash94	9e343347-e3b6-48ba-8	10858	ST-Concrete_Recta Pipe Fittings	PL-Elbow_Gen	0.000 m	Irrelevant Clashes
Clash95	9e343347-e3b6-48ba-8	10858	ST-Concrete_Recta Pipe Fittings	PL-Elbow_Gen	0.000 m	Irrelevant Clashes
Clash96	9e343347-e3b6-48ba-8	10858	ST-Concrete_Recta Pipe Fittings	PL-Elbow_Gen	0.000 m	Irrelevant Clashes
Clash97	9e343347-e3b6-48ba-8	10858	ST-Concrete_Recta Pipe Fittings	PL-Elbow_Gen	0.000 m	Irrelevant Clashes
Clash98	9e343347-e3b6-48ba-8	10800	ST-Concrete_Recta Pipes	PL-Opening Cu	0.000 m	Irrelevant Clashes
Clash99	9e343347-e3b6-48ba-8	10759	ST-Concrete_Recta Pipes	PL-Opening Cu	0.000 m	Irrelevant Clashes
Clash100	9e343347-e3b6-48ba-8	10800	ST-Concrete_Recta Pipes	PL-Opening Cu	0.000 m	Irrelevant Clashes

Clash102	9e343347-e3b6-48ba-8	10759	ST-Concrete_Recta Pipes	PL-Opening Cu	0.000 m	Irrelevant Clashes
Clash103	9e343347-e3b6-48ba-8	10759	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.087 m	Irrelevant Clashes
Clash104	9e343347-e3b6-48ba-8	10858	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.076 m	Irrelevant Clashes
Clash105	9e343347-e3b6-48ba-8	10858	ST-Concrete_Recta Pipes	PL-Opening Cu	0.000 m	Irrelevant Clashes
Clash106	9e343347-e3b6-48ba-8	10858	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.039 m	Irrelevant Clashes
Clash107	9e343347-e3b6-48ba-8	10858	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.112 m	Irrelevant Clashes
Clash108	9e343347-e3b6-48ba-8	10858	ST-Concrete_Recta Pipes	PL-Opening Cu	0.000 m	Irrelevant Clashes
Clash109	9e343347-e3b6-48ba-8	10858	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.042 m	Irrelevant Clashes
Clash110	9e343347-e3b6-48ba-8	10808	ST-Concrete_Recta Mechanical Equipment	ME-WSHP_Hor	-0.267 m	Serious Clashes
Clash111	9e343347-e3b6-48ba-8	10806	ST-Concrete_Recta Mechanical Equipment	ME-WSHP_Hor	-0.267 m	Serious Clashes
Clash112	9e343347-e3b6-48ba-8	10800	ST-Concrete_Recta Mechanical Equipment	ME-WSHP_Hor	-0.133 m	Serious Clashes
Clash113	9e343347-e3b6-48ba-8	10839	ST-Concrete_Recta Mechanical Equipment	ME-WSHP_Hor	-0.309 m	Serious Clashes
Clash114	9e343347-e3b6-48ba-8	10759	ST-Concrete_Recta Mechanical Equipment	ME-WSHP_Hor	-0.243 m	Serious Clashes
Clash115	9e343347-e3b6-48ba-8	10800	ST-Concrete_Recta Pipe Fittings	PL-Pipe_Elbow	-0.003 m	Irrelevant Clashes
Clash116	9e343347-e3b6-48ba-8	10759	ST-Concrete_Recta Pipe Fittings	PL-Pipe_Transi	0.000 m	Irrelevant Clashes
Clash117	9e343347-e3b6-48ba-8	10759	ST-Concrete_Recta Pipe Fittings	PL-Pipe_Elbow	-0.006 m	Irrelevant Clashes
Clash118	9e343347-e3b6-48ba-8	10800	ST-Concrete_Recta Pipe Fittings	PL-Pipe_Elbow	0.000 m	Irrelevant Clashes
Clash119	9e343347-e3b6-48ba-8	10759	ST-Concrete_Recta Pipe Fittings	PL-Pipe_Transi	0.000 m	Irrelevant Clashes
Clash120	9e343347-e3b6-48ba-8	10759	ST-Concrete_Recta Pipe Fittings	PL-Pipe_Elbow	0.000 m	Irrelevant Clashes
Clash121	9e343347-e3b6-48ba-8	10978	ST-Concrete_Recta Pipes	PL-Opening Cu	0.000 m	Irrelevant Clashes
Clash122	9e343347-e3b6-48ba-8	10978	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.078 m	Legal Clashes
Clash123	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta Pipes	PL-Opening Cu	0.000 m	Irrelevant Clashes
Clash124	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.016 m	Irrelevant Clashes
Clash125	9e343347-e3b6-48ba-8	10877	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.004 m	Irrelevant Clashes
Clash126	9e343347-e3b6-48ba-8	10878	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.011 m	Irrelevant Clashes
Clash127	9e343347-e3b6-48ba-8	10878	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.017 m	Irrelevant Clashes
Clash128	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.011 m	Irrelevant Clashes
Clash129	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.011 m	Irrelevant Clashes
Clash130	9e343347-e3b6-48ba-8	10978	ST-Concrete_Recta Pipes	PL-Opening Cu	0.000 m	Irrelevant Clashes
Clash131	9e343347-e3b6-48ba-8	10978	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.078 m	Irrelevant Clashes
Clash132	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta Pipes	PL-Opening Cu	0.000 m	Irrelevant Clashes
Clash133	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.016 m	Irrelevant Clashes
Clash134	9e343347-e3b6-48ba-8	10877	ST-Concrete_Recta Pipes	PL-Opening Cu	-0.004 m	Irrelevant Clashes

Clash136	9e343347-e3b6-48ba-8	10878	ST-Concrete_Recta	Pipes	PL-Opening Cu	-0.017 m	Irrelevant Clashes
Clash137	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta	Pipes	PL-Opening Cu	-0.011 m	Irrelevant Clashes
Clash138	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta	Pipes	PL-Opening Cu	-0.011 m	Irrelevant Clashes
Clash139	9e343347-e3b6-48ba-8	10978	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Transi	0.000 m	Irrelevant Clashes
Clash140	9e343347-e3b6-48ba-8	10978	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Elbow	0.000 m	Irrelevant Clashes
Clash141	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Elbow	0.000 m	Irrelevant Clashes
Clash142	9e343347-e3b6-48ba-8	10877	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Transi	0.000 m	Irrelevant Clashes
Clash143	9e343347-e3b6-48ba-8	10878	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Elbow	0.000 m	Irrelevant Clashes
Clash144	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Elbow	0.000 m	Irrelevant Clashes
Clash145	9e343347-e3b6-48ba-8	10978	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Transi	0.000 m	Irrelevant Clashes
Clash146	9e343347-e3b6-48ba-8	10978	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Elbow	0.000 m	Irrelevant Clashes
Clash147	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Elbow	0.000 m	Irrelevant Clashes
Clash148	9e343347-e3b6-48ba-8	10877	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Transi	0.000 m	Irrelevant Clashes
Clash149	9e343347-e3b6-48ba-8	10878	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Elbow	0.000 m	Irrelevant Clashes
Clash150	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta	Pipe Fittings	PL-Pipe_Elbow	0.000 m	Irrelevant Clashes
Clash151	9e343347-e3b6-48ba-8	10978	ST-Concrete_Recta	Mechanical Equipment	ME-WSHP_Hor	-0.012 m	Irrelevant Clashes
Clash152	9e343347-e3b6-48ba-8	10895	ST-Concrete_Recta	Mechanical Equipment	ME-WSHP_Hor	-0.248 m	Serious Clashes
Clash153	9e343347-e3b6-48ba-8	10885	ST-Concrete_Recta	Mechanical Equipment	ME-WSHP_Hor	-0.162 m	Serious Clashes
Clash154	9e343347-e3b6-48ba-8	10877	ST-Concrete_Recta	Mechanical Equipment	ME-WSHP_Hor	-0.350 m	Serious Clashes
Clash155	9e343347-e3b6-48ba-8	10982	ST-Concrete_Recta	Mechanical Equipment	ME-WSHP_Hor	-0.309 m	Serious Clashes
Clash156	9e343347-e3b6-48ba-8	10905	ST-Concrete_Recta	Mechanical Equipment	ME-Centrifugal	-0.165 m	Serious Clashes
Clash157	60d7d430-05c3-42a3-9	10635	ST-Concrete_Recta	Pipes	PL-Opening Cu	-0.181 m	Legal Clashes
Clash158	60d7d430-05c3-42a3-9	10611	ST-Concrete_Recta	Mechanical Equipment	ME-WSHP_Hor	-0.189 m	Serious Clashes
Clash159	60d7d430-05c3-42a3-9	10604	ST-Concrete_Recta	Mechanical Equipment	ME-WSHP_Hor	-0.320 m	Serious Clashes
Clash160	b6fde0f5-776f-422a-a2	10716	ST-Concrete_Recta	Mechanical Equipment	ME-WSHP_Hor	-0.275 m	Serious Clashes
Clash161	60d7d430-05c3-42a3-9	10602	ST-Concrete_Recta	Mechanical Equipment	ME-WSHP_Hor	-0.292 m	Serious Clashes
Clash162	fe3a0b48-5c57-4269-9	4966	AR-Floor_Topping-5	Ducts	ME-Mitered_E	-0.685 m	Irrelevant Clashes
Clash163	bc93338f-9d08-4ad9-8	5009	AR-Floor_Finish_Ca	Ducts	ME-Mitered_E	-0.644 m	Irrelevant Clashes
Clash164	fe3a0b48-5c57-4269-9	4968	AR-Floor_Topping-5	Ducts	ME-Mitered_E	-0.168 m	Irrelevant Clashes
Clash165	bc93338f-9d08-4ad9-8	5037	AR-Floor_Finish_Ca	Ducts	ME-Mitered_E	-0.183 m	Irrelevant Clashes
Clash166	62c3a09a-b28f-4697-8	1580	AR-Roof-100mm	Ducts	ME-Mitered_E	-1.259 m	Serious Clashes
Clash167	2dcdbfab-f756-475c-82	1587	AR-Roof_finish-52m	Ducts	ME-Mitered_E	-1.160 m	Serious Clashes
Clash168	89bad1f9-d63a-43b9-8	4969	AR-Floor_Topping-5	Ducts	ME-Mitered_E	-0.083 m	Irrelevant Clashes

Clash170	bc93338f-9d08-4ad9-8	4977	AR-Floor_Finish_Ca	Ducts	ME-Mitered_E	-0.075 m	Irrelevant Clashes
Clash171	bc93338f-9d08-4ad9-8	5004	AR-Floor_Topping-5	Ducts	ME-Mitered_E	-0.060 m	Irrelevant Clashes
Clash172	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash173	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash174	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash175	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash176	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash177	49728726-7a6a-4de8-b	1659	AR-Compound_Ceil	Air Terminals	ME-Supply_Dif	-0.010 m	Irrelevant Clashes
Clash178	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash179	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash180	62c3a09a-b28f-4697-8	1614	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.005 m	Irrelevant Clashes
Clash181	62c3a09a-b28f-4697-8	1619	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash182	62c3a09a-b28f-4697-8	1619	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash183	62c3a09a-b28f-4697-8	1620	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash184	62c3a09a-b28f-4697-8	1620	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash185	62c3a09a-b28f-4697-8	1620	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash186	62c3a09a-b28f-4697-8	1620	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash187	62c3a09a-b28f-4697-8	1620	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash188	62c3a09a-b28f-4697-8	1620	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash189	62c3a09a-b28f-4697-8	1621	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash190	62c3a09a-b28f-4697-8	1628	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash191	62c3a09a-b28f-4697-8	1621	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash192	62c3a09a-b28f-4697-8	1628	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash193	62c3a09a-b28f-4697-8	1621	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash194	62c3a09a-b28f-4697-8	1629	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash195	62c3a09a-b28f-4697-8	1621	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash196	62c3a09a-b28f-4697-8	1629	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash197	62c3a09a-b28f-4697-8	1621	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash198	62c3a09a-b28f-4697-8	1630	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash199	62c3a09a-b28f-4697-8	1621	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash200	62c3a09a-b28f-4697-8	1630	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash201	62c3a09a-b28f-4697-8	1623	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash202	62c3a09a-b28f-4697-8	1623	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes

Clash204	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.093 m Irrelevant Clashes
Clash205	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash206	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash207	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.093 m Irrelevant Clashes
Clash208	80bf5fea-836a-49fb-ae	1663	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.093 m Irrelevant Clashes
Clash209	62c3a09a-b28f-4697-8	1631	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.009 m Irrelevant Clashes
Clash210	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash211	62c3a09a-b28f-4697-8	1619	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash212	62c3a09a-b28f-4697-8	1620	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash213	62c3a09a-b28f-4697-8	1620	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.093 m Irrelevant Clashes
Clash214	62c3a09a-b28f-4697-8	1620	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash215	62c3a09a-b28f-4697-8	1631	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m Irrelevant Clashes
Clash216	62c3a09a-b28f-4697-8	1621	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash217	80bf5fea-836a-49fb-ae	1664	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.076 m Irrelevant Clashes
Clash218	62c3a09a-b28f-4697-8	1621	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash219	62c3a09a-b28f-4697-8	1621	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash220	62c3a09a-b28f-4697-8	1621	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.093 m Irrelevant Clashes
Clash221	62c3a09a-b28f-4697-8	1631	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m Irrelevant Clashes
Clash222	62c3a09a-b28f-4697-8	1620	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash223	62c3a09a-b28f-4697-8	1623	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash224	62c3a09a-b28f-4697-8	1628	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash225	62c3a09a-b28f-4697-8	1629	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash226	62c3a09a-b28f-4697-8	1629	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.093 m Irrelevant Clashes
Clash227	62c3a09a-b28f-4697-8	1632	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m Irrelevant Clashes
Clash228	62c3a09a-b28f-4697-8	1630	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m Irrelevant Clashes
Clash229	62c3a09a-b28f-4697-8	1631	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash230	62c3a09a-b28f-4697-8	1632	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash231	62c3a09a-b28f-4697-8	1633	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.092 m Irrelevant Clashes
Clash232	62c3a09a-b28f-4697-8	1631	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash233	62c3a09a-b28f-4697-8	1617	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.088 m Irrelevant Clashes
Clash234	62c3a09a-b28f-4697-8	1632	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m Irrelevant Clashes
Clash235	62c3a09a-b28f-4697-8	1633	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m Irrelevant Clashes
Clash236	62c3a09a-b28f-4697-8	1633	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m Irrelevant Clashes

Clash238	62c3a09a-b28f-4697-8	1625	AR-Compound_ceili	Air Terminals	ME-Exhaust_G	-0.088 m	Irrelevant Clashes
Clash239	62c3a09a-b28f-4697-8	1624	AR-Compound_ceili	Air Terminals	ME-Exhaust_G	-0.088 m	Irrelevant Clashes
Clash240	62c3a09a-b28f-4697-8	1627	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash241	62c3a09a-b28f-4697-8	1627	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash242	62c3a09a-b28f-4697-8	1627	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.006 m	Irrelevant Clashes
Clash243	62c3a09a-b28f-4697-8	1627	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.006 m	Irrelevant Clashes
Clash244	62c3a09a-b28f-4697-8	1626	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash245	62c3a09a-b28f-4697-8	1626	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash246	62c3a09a-b28f-4697-8	1626	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash247	62c3a09a-b28f-4697-8	1626	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash248	62c3a09a-b28f-4697-8	1611	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash249	62c3a09a-b28f-4697-8	1612	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash250	62c3a09a-b28f-4697-8	1613	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash251	62c3a09a-b28f-4697-8	1613	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash252	62c3a09a-b28f-4697-8	1613	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.002 m	Irrelevant Clashes
Clash253	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash254	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.055 m	Irrelevant Clashes
Clash255	62c3a09a-b28f-4697-8	1635	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash256	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash257	62c3a09a-b28f-4697-8	1636	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash258	62c3a09a-b28f-4697-8	1636	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash259	62c3a09a-b28f-4697-8	1637	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash260	62c3a09a-b28f-4697-8	1637	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash261	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash262	62c3a09a-b28f-4697-8	1637	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash263	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash264	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash265	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash266	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash267	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash268	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.058 m	Irrelevant Clashes
Clash269	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash270	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.058 m	Irrelevant Clashes

Clash272	62c3a09a-b28f-4697-8	1640	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash273	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash274	62c3a09a-b28f-4697-8	1640	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash275	62c3a09a-b28f-4697-8	1641	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.058 m	Irrelevant Clashes
Clash276	62c3a09a-b28f-4697-8	1648	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash277	62c3a09a-b28f-4697-8	1641	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash278	62c3a09a-b28f-4697-8	1641	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash279	62c3a09a-b28f-4697-8	1648	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.058 m	Irrelevant Clashes
Clash280	62c3a09a-b28f-4697-8	1641	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash281	62c3a09a-b28f-4697-8	1649	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash282	62c3a09a-b28f-4697-8	1642	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash283	62c3a09a-b28f-4697-8	1649	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash284	62c3a09a-b28f-4697-8	1642	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash285	62c3a09a-b28f-4697-8	1649	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash286	62c3a09a-b28f-4697-8	1642	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash287	62c3a09a-b28f-4697-8	1649	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash288	62c3a09a-b28f-4697-8	1642	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash289	62c3a09a-b28f-4697-8	1650	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash290	62c3a09a-b28f-4697-8	1643	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.048 m	Irrelevant Clashes
Clash291	62c3a09a-b28f-4697-8	1650	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash292	62c3a09a-b28f-4697-8	1643	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash293	62c3a09a-b28f-4697-8	1650	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.058 m	Irrelevant Clashes
Clash294	62c3a09a-b28f-4697-8	1643	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash295	62c3a09a-b28f-4697-8	1650	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash296	62c3a09a-b28f-4697-8	1643	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash297	62c3a09a-b28f-4697-8	1651	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash298	62c3a09a-b28f-4697-8	1644	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash299	62c3a09a-b28f-4697-8	1651	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.049 m	Irrelevant Clashes
Clash300	62c3a09a-b28f-4697-8	1648	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.058 m	Irrelevant Clashes
Clash301	62c3a09a-b28f-4697-8	1651	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.058 m	Irrelevant Clashes
Clash302	62c3a09a-b28f-4697-8	1648	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash303	62c3a09a-b28f-4697-8	1651	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash304	62c3a09a-b28f-4697-8	1652	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes

Clash306	62c3a09a-b28f-4697-8	1652	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash307	62c3a09a-b28f-4697-8	1652	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.046 m	Irrelevant Clashes
Clash308	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash309	62c3a09a-b28f-4697-8	1642	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash310	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash311	62c3a09a-b28f-4697-8	1642	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash312	62c3a09a-b28f-4697-8	1636	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash313	62c3a09a-b28f-4697-8	1642	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash314	62c3a09a-b28f-4697-8	1636	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash315	62c3a09a-b28f-4697-8	1637	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash316	49728726-7a6a-4de8-b	1661	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash317	62c3a09a-b28f-4697-8	1637	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash318	62c3a09a-b28f-4697-8	1643	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash319	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash320	62c3a09a-b28f-4697-8	1643	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash321	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash322	62c3a09a-b28f-4697-8	1648	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash323	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash324	62c3a09a-b28f-4697-8	1648	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash325	62c3a09a-b28f-4697-8	1649	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash326	62c3a09a-b28f-4697-8	1638	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash327	62c3a09a-b28f-4697-8	1649	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash328	49728726-7a6a-4de8-b	1662	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash329	62c3a09a-b28f-4697-8	1650	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash330	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash331	62c3a09a-b28f-4697-8	1650	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash332	62c3a09a-b28f-4697-8	1639	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash333	62c3a09a-b28f-4697-8	1651	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash334	62c3a09a-b28f-4697-8	1640	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash335	62c3a09a-b28f-4697-8	1651	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash336	62c3a09a-b28f-4697-8	1641	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash337	62c3a09a-b28f-4697-8	1652	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes
Clash338	62c3a09a-b28f-4697-8	1652	AR-Compound_ceili	Air Terminals	ME-Return_Dif	-0.089 m	Irrelevant Clashes

Clash340	62c3a09a-b28f-4697-8	1647	AR-Compound_ceili	Air Terminals	ME-Exhaust_G	-0.053 m	Irrelevant Clashes
Clash341	62c3a09a-b28f-4697-8	1645	AR-Compound_ceili	Air Terminals	ME-Supply_Dif	-0.058 m	Irrelevant Clashes
Clash342	49728726-7a6a-4de8-b	1657	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.216 m	Legal Clashes
Clash343	49728726-7a6a-4de8-b	1657	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.213 m	Legal Clashes
Clash344	49728726-7a6a-4de8-b	1657	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.213 m	Legal Clashes
Clash345	62c3a09a-b28f-4697-8	1653	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.197 m	Legal Clashes
Clash346	62c3a09a-b28f-4697-8	1653	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.197 m	Legal Clashes
Clash347	62c3a09a-b28f-4697-8	1653	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.197 m	Legal Clashes
Clash348	49728726-7a6a-4de8-b	1656	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.126 m	Legal Clashes
Clash349	62c3a09a-b28f-4697-8	1653	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.219 m	Legal Clashes
Clash350	49728726-7a6a-4de8-b	1656	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.213 m	Legal Clashes
Clash351	49728726-7a6a-4de8-b	1657	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.213 m	Legal Clashes
Clash352	62c3a09a-b28f-4697-8	1653	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.197 m	Legal Clashes
Clash353	49728726-7a6a-4de8-b	1656	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.219 m	Legal Clashes
Clash354	62c3a09a-b28f-4697-8	1653	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.208 m	Legal Clashes
Clash355	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Pipes	PL-Opening Cu	-0.307 m	Serious Clashes
Clash356	62c3a09a-b28f-4697-8	1634	AR-Compound_ceili	Pipes	PL-Opening Cu	-0.064 m	Irrelevant Clashes
Clash357	62c3a09a-b28f-4697-8	1611	AR-Compound_ceili	Pipes	PL-Opening Cu	-0.209 m	Serious Clashes
Clash358	49728726-7a6a-4de8-b	1659	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.042 m	Irrelevant Clashes
Clash359	49728726-7a6a-4de8-b	1658	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.063 m	Irrelevant Clashes
Clash360	62c3a09a-b28f-4697-8	1654	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.063 m	Irrelevant Clashes
Clash361	62c3a09a-b28f-4697-8	1654	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.063 m	Irrelevant Clashes
Clash362	62c3a09a-b28f-4697-8	1654	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.069 m	Irrelevant Clashes
Clash363	49728726-7a6a-4de8-b	1658	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.069 m	Irrelevant Clashes
Clash364	49728726-7a6a-4de8-b	1658	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.069 m	Irrelevant Clashes
Clash365	49728726-7a6a-4de8-b	1658	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.069 m	Irrelevant Clashes
Clash366	49728726-7a6a-4de8-b	1658	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.069 m	Irrelevant Clashes
Clash367	49728726-7a6a-4de8-b	1658	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.069 m	Irrelevant Clashes
Clash368	62c3a09a-b28f-4697-8	1655	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.063 m	Irrelevant Clashes
Clash369	49728726-7a6a-4de8-b	1659	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.069 m	Irrelevant Clashes
Clash370	62c3a09a-b28f-4697-8	1611	AR-Compound_ceili	Pipes	PL-Opening Cu	-1.280 m	Serious Clashes
Clash371	62c3a09a-b28f-4697-8	1654	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.058 m	Irrelevant Clashes
Clash372	49728726-7a6a-4de8-b	1659	AR-Compound_Ceil	Pipes	PL-Opening Cu	-0.064 m	Irrelevant Clashes

Clash374	62c3a09a-b28f-4697-8	1592	AR-Compound_ceili	Pipes	PL-Opening Cu	-0.067 m Irrelevant Clashes
Clash375	62c3a09a-b28f-4697-8	1592	AR-Compound_ceili	Pipes	PL-Opening Cu	-0.588 m Serious Clashes
Clash376	60d7d430-05c3-42a3-9	10623	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.112 m Serious Clashes
Clash377	60d7d430-05c3-42a3-9	10673	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.027 m Irrelevant Clashes
Clash378	60d7d430-05c3-42a3-9	10685	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	0.000 m Irrelevant Clashes
Clash379	3df76403-f5f5-497a-9a	11024	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.028 m Irrelevant Clashes
Clash380	60d7d430-05c3-42a3-9	10648	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.014 m Irrelevant Clashes
Clash381	3df76403-f5f5-497a-9a	11024	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.028 m Irrelevant Clashes
Clash382	60d7d430-05c3-42a3-9	10648	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.014 m Irrelevant Clashes
Clash383	3df76403-f5f5-497a-9a	11024	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.028 m Irrelevant Clashes
Clash384	45b96ffc-b703-403f-b5	10698	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.028 m Irrelevant Clashes
Clash385	89d2b365-bf62-438e-b	11014	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.028 m Irrelevant Clashes
Clash386	60d7d430-05c3-42a3-9	10625	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.020 m Irrelevant Clashes
Clash387	60d7d430-05c3-42a3-9	10625	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.034 m Irrelevant Clashes
Clash388	60d7d430-05c3-42a3-9	10628	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.038 m Serious Clashes
Clash389	60d7d430-05c3-42a3-9	10628	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.026 m Serious Clashes
Clash390	60d7d430-05c3-42a3-9	10683	ST-Concrete_Recta	Air Terminals	ME-Return_Gri	-0.079 m Irrelevant Clashes
Clash391	60d7d430-05c3-42a3-9	10645	ST-Concrete_Recta	Air Terminals	ME-Return_Gri	-0.014 m Irrelevant Clashes
Clash392	60d7d430-05c3-42a3-9	10675	ST-Concrete_Recta	Air Terminals	ME-Return_Gri	-0.037 m Irrelevant Clashes
Clash393	60d7d430-05c3-42a3-9	10676	ST-Concrete_Recta	Air Terminals	ME-Return_Gri	-0.037 m Irrelevant Clashes
Clash394	60d7d430-05c3-42a3-9	10601	ST-Concrete_Recta	Air Terminals	ME-Return_Gri	-0.023 m Irrelevant Clashes
Clash395	60d7d430-05c3-42a3-9	10681	ST-Concrete_Recta	Air Terminals	ME-Return_Gri	0.000 m Irrelevant Clashes
Clash396	b6fde0f5-776f-422a-a2	10715	ST-Concrete_Recta	Air Terminals	ME-Return_Gri	-0.104 m Serious Clashes
Clash397	60d7d430-05c3-42a3-9	10669	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.037 m Irrelevant Clashes
Clash398	60d7d430-05c3-42a3-9	10669	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.028 m Irrelevant Clashes
Clash399	60d7d430-05c3-42a3-9	10619	ST-Concrete_Recta	Air Terminals	ME-Return_Gri	-0.045 m Irrelevant Clashes
Clash400	60d7d430-05c3-42a3-9	10620	ST-Concrete_Recta	Air Terminals	ME-Return_Gri	-0.029 m Irrelevant Clashes
Clash401	60d7d430-05c3-42a3-9	10620	ST-Concrete_Recta	Air Terminals	ME-Return_Gri	-0.029 m Irrelevant Clashes
Clash402	9e343347-e3b6-48ba-8	10854	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.185 m Irrelevant Clashes
Clash403	3df76403-f5f5-497a-9a	11026	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.134 m Irrelevant Clashes
Clash404	3df76403-f5f5-497a-9a	11026	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.161 m Irrelevant Clashes
Clash405	9e343347-e3b6-48ba-8	10844	ST-Concrete_Recta	Air Terminals	ME-Supply_Dif	-0.133 m Irrelevant Clashes
Clash406	48891eaa-9041-405b-a	10405	ST-Concrete_Round	Air Terminals	ME-Supply_Dif	-0.028 m Serious Clashes

Clash408	bc93338f-9d08-4ad9-8	5002	AR-Floor_Finish_Ca	Pipe Fittings	PL-Coupling_G	-0.022 m	Irrelevant Clashes
Clash409	89bad1f9-d63a-43b9-8	4969	AR-Floor_Topping-5	Pipe Fittings	PL-Coupling_G	-0.003 m	Irrelevant Clashes
Clash410	bc93338f-9d08-4ad9-8	5002	AR-Floor_Finish_Ca	Pipe Fittings	PL-Coupling_G	-0.018 m	Irrelevant Clashes
Clash411	89bad1f9-d63a-43b9-8	4969	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.047 m	Irrelevant Clashes
Clash412	89bad1f9-d63a-43b9-8	4969	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.028 m	Irrelevant Clashes
Clash413	89bad1f9-d63a-43b9-8	1585	AR-Roof-100mm	Pipes	PL-Opening Cu	-0.309 m	Legal Clashes
Clash414	2dcdbfab-f756-475c-82	1588	AR-Roof_finish-52m	Pipes	PL-Opening Cu	-0.309 m	Legal Clashes
Clash415	89bad1f9-d63a-43b9-8	1585	AR-Roof-100mm	Pipes	PL-Opening Cu	-0.671 m	Legal Clashes
Clash416	2dcdbfab-f756-475c-82	1588	AR-Roof_finish-52m	Pipes	PL-Opening Cu	-0.671 m	Legal Clashes
Clash417	2dcdbfab-f756-475c-82	1587	AR-Roof_finish-52m	Mechanical Equipment	ME-Outdoor_A	-0.718 m	Irrelevant Clashes
Clash418	2dcdbfab-f756-475c-82	1588	AR-Roof_finish-52m	Mechanical Equipment	ME-Cooling_To	-0.276 m	Irrelevant Clashes
Clash419	89bad1f9-d63a-43b9-8	1585	AR-Roof-100mm	Mechanical Equipment	ME-Centrifugal	-0.126 m	Irrelevant Clashes
Clash420	2dcdbfab-f756-475c-82	1588	AR-Roof_finish-52m	Mechanical Equipment	ME-Centrifugal	-0.025 m	Irrelevant Clashes
Clash421	fe3a0b48-5c57-4269-9	4968	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.426 m	Legal Clashes
Clash422	bc93338f-9d08-4ad9-8	5037	AR-Floor_Finish_Ca	Pipes	PL-Opening Cu	-0.441 m	Legal Clashes
Clash423	fe3a0b48-5c57-4269-9	4968	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.206 m	Irrelevant Clashes
Clash424	bc93338f-9d08-4ad9-8	5037	AR-Floor_Finish_Ca	Pipes	PL-Opening Cu	-0.156 m	Irrelevant Clashes
Clash425	60d7d430-05c3-42a3-9	10623	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.094 m	Irrelevant Clashes
Clash426	60d7d430-05c3-42a3-9	10621	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.134 m	Serious Clashes
Clash427	60d7d430-05c3-42a3-9	10623	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.198 m	Serious Clashes
Clash428	60d7d430-05c3-42a3-9	10636	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.034 m	Irrelevant Clashes
Clash429	60d7d430-05c3-42a3-9	10635	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.034 m	Serious Clashes
Clash430	60d7d430-05c3-42a3-9	10636	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.034 m	Irrelevant Clashes
Clash431	60d7d430-05c3-42a3-9	10621	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.173 m	Serious Clashes
Clash432	60d7d430-05c3-42a3-9	10636	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.258 m	Serious Clashes
Clash433	60d7d430-05c3-42a3-9	10610	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.027 m	Irrelevant Clashes
Clash434	45b96ffc-b703-403f-b5	10700	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.281 m	Serious Clashes
Clash435	60d7d430-05c3-42a3-9	10636	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.012 m	Irrelevant Clashes
Clash436	45b96ffc-b703-403f-b5	10701	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.323 m	Serious Clashes
Clash437	60d7d430-05c3-42a3-9	10637	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.009 m	Irrelevant Clashes
Clash438	60d7d430-05c3-42a3-9	10610	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.102 m	Irrelevant Clashes
Clash439	60d7d430-05c3-42a3-9	10610	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.102 m	Irrelevant Clashes
Clash440	60d7d430-05c3-42a3-9	10610	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.086 m	Irrelevant Clashes

Clash442	60d7d430-05c3-42a3-9	10600	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.388 m Serious Clashes
Clash443	60d7d430-05c3-42a3-9	10671	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.322 m Serious Clashes
Clash444	60d7d430-05c3-42a3-9	10638	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.299 m Serious Clashes
Clash445	60d7d430-05c3-42a3-9	10642	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.194 m Irrelevant Clashes
Clash446	45b96ffc-b703-403f-b5	10699	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.348 m Serious Clashes
Clash447	45b96ffc-b703-403f-b5	10700	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.042 m Serious Clashes
Clash448	60d7d430-05c3-42a3-9	10672	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.227 m Serious Clashes
Clash449	60d7d430-05c3-42a3-9	10643	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.062 m Irrelevant Clashes
Clash450	3df76403-f5f5-497a-9a	11022	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.213 m Serious Clashes
Clash451	3df76403-f5f5-497a-9a	11023	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.216 m Serious Clashes
Clash452	60d7d430-05c3-42a3-9	10673	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.323 m Serious Clashes
Clash453	3df76403-f5f5-497a-9a	11024	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.272 m Serious Clashes
Clash454	3df76403-f5f5-497a-9a	11024	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.007 m Irrelevant Clashes
Clash455	60d7d430-05c3-42a3-9	10685	ST-Concrete_Recta	Ducts	ME-Mitered_E	0.000 m Irrelevant Clashes
Clash456	60d7d430-05c3-42a3-9	10648	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.016 m Irrelevant Clashes
Clash457	3df76403-f5f5-497a-9a	11023	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.360 m Serious Clashes
Clash458	60d7d430-05c3-42a3-9	10648	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.116 m Irrelevant Clashes
Clash459	3df76403-f5f5-497a-9a	11024	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.007 m Irrelevant Clashes
Clash460	3df76403-f5f5-497a-9a	11024	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.292 m Serious Clashes
Clash461	3df76403-f5f5-497a-9a	11024	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.007 m Irrelevant Clashes
Clash462	60d7d430-05c3-42a3-9	10648	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.224 m Irrelevant Clashes
Clash463	60d7d430-05c3-42a3-9	10676	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.380 m Serious Clashes
Clash464	60d7d430-05c3-42a3-9	10684	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.252 m Serious Clashes
Clash465	3df76403-f5f5-497a-9a	11022	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.280 m Serious Clashes
Clash466	89d2b365-bf62-438e-b	11013	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.347 m Serious Clashes
Clash467	60d7d430-05c3-42a3-9	10679	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.275 m Serious Clashes
Clash468	89d2b365-bf62-438e-b	11014	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.301 m Serious Clashes
Clash469	60d7d430-05c3-42a3-9	10679	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.012 m Irrelevant Clashes
Clash470	45b96ffc-b703-403f-b5	10698	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.007 m Irrelevant Clashes
Clash471	60d7d430-05c3-42a3-9	10680	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.012 m Irrelevant Clashes
Clash472	89d2b365-bf62-438e-b	11014	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.007 m Irrelevant Clashes
Clash473	45b96ffc-b703-403f-b5	10695	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.123 m Irrelevant Clashes
Clash474	89d2b365-bf62-438e-b	11014	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.007 m Irrelevant Clashes

Clash476	89d2b365-bf62-438e-b	11012 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.330 m	Serious Clashes
Clash477	60d7d430-05c3-42a3-9	10680 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.207 m	Serious Clashes
Clash478	45b96ffc-b703-403f-b5	10695 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.048 m	Serious Clashes
Clash479	60d7d430-05c3-42a3-9	10625 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.052 m	Irrelevant Clashes
Clash480	60d7d430-05c3-42a3-9	10657 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.248 m	Serious Clashes
Clash481	60d7d430-05c3-42a3-9	10625 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.052 m	Irrelevant Clashes
Clash482	60d7d430-05c3-42a3-9	10628 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.064 m	Irrelevant Clashes
Clash483	60d7d430-05c3-42a3-9	10655 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.352 m	Serious Clashes
Clash484	60d7d430-05c3-42a3-9	10654 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.291 m	Serious Clashes
Clash485	60d7d430-05c3-42a3-9	10628 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.134 m	Serious Clashes
Clash486	60d7d430-05c3-42a3-9	10647 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.275 m	Serious Clashes
Clash487	60d7d430-05c3-42a3-9	10683 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.239 m	Serious Clashes
Clash488	60d7d430-05c3-42a3-9	10628 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.060 m	Irrelevant Clashes
Clash489	60d7d430-05c3-42a3-9	10683 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.040 m	Serious Clashes
Clash490	60d7d430-05c3-42a3-9	10683 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.120 m	Irrelevant Clashes
Clash491	60d7d430-05c3-42a3-9	10653 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.272 m	Serious Clashes
Clash492	60d7d430-05c3-42a3-9	10604 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.044 m	Serious Clashes
Clash493	60d7d430-05c3-42a3-9	10611 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.183 m	Serious Clashes
Clash494	60d7d430-05c3-42a3-9	10605 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.044 m	Serious Clashes
Clash495	60d7d430-05c3-42a3-9	10612 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.043 m	Serious Clashes
Clash496	60d7d430-05c3-42a3-9	10645 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.233 m	Serious Clashes
Clash497	60d7d430-05c3-42a3-9	10645 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.020 m	Serious Clashes
Clash498	60d7d430-05c3-42a3-9	10641 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.043 m	Irrelevant Clashes
Clash499	60d7d430-05c3-42a3-9	10601 ST-Concrete_Recta Ducts	ME-Mitered_E	0.000 m	Irrelevant Clashes
Clash500	60d7d430-05c3-42a3-9	10660 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.121 m	Irrelevant Clashes
Clash501	60d7d430-05c3-42a3-9	10680 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.091 m	Irrelevant Clashes
Clash502	60d7d430-05c3-42a3-9	10680 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.094 m	Irrelevant Clashes
Clash503	60d7d430-05c3-42a3-9	10681 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.121 m	Irrelevant Clashes
Clash504	60d7d430-05c3-42a3-9	10669 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.220 m	Serious Clashes
Clash505	60d7d430-05c3-42a3-9	10669 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.017 m	Irrelevant Clashes
Clash506	60d7d430-05c3-42a3-9	10669 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.007 m	Irrelevant Clashes
Clash507	60d7d430-05c3-42a3-9	10681 ST-Concrete_Recta Ducts	ME-Mitered_E	0.000 m	Irrelevant Clashes
Clash508	60d7d430-05c3-42a3-9	10659 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.254 m	Serious Clashes

Clash510	b6fde0f5-776f-422a-a2	10715	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.148 m Serious Clashes
Clash511	60d7d430-05c3-42a3-9	10620	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.006 m Irrelevant Clashes
Clash512	b6fde0f5-776f-422a-a2	10715	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.116 m Serious Clashes
Clash513	b6fde0f5-776f-422a-a2	10719	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.180 m Serious Clashes
Clash514	b6fde0f5-776f-422a-a2	10712	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.161 m Serious Clashes
Clash515	60d7d430-05c3-42a3-9	10682	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.305 m Serious Clashes
Clash516	60d7d430-05c3-42a3-9	10687	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.247 m Serious Clashes
Clash517	60d7d430-05c3-42a3-9	10602	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.108 m Serious Clashes
Clash518	60d7d430-05c3-42a3-9	10674	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.081 m Serious Clashes
Clash519	60d7d430-05c3-42a3-9	10675	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.264 m Serious Clashes
Clash520	60d7d430-05c3-42a3-9	10685	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.081 m Serious Clashes
Clash521	60d7d430-05c3-42a3-9	10686	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.081 m Serious Clashes
Clash522	60d7d430-05c3-42a3-9	10652	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.136 m Serious Clashes
Clash523	b6fde0f5-776f-422a-a2	10716	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.045 m Irrelevant Clashes
Clash524	60d7d430-05c3-42a3-9	10621	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.185 m Serious Clashes
Clash525	60d7d430-05c3-42a3-9	10619	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.348 m Serious Clashes
Clash526	60d7d430-05c3-42a3-9	10623	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.028 m Irrelevant Clashes
Clash527	60d7d430-05c3-42a3-9	10641	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.131 m Serious Clashes
Clash528	60d7d430-05c3-42a3-9	10637	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.187 m Serious Clashes
Clash529	45b96ffc-b703-403f-b5	10700	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m Irrelevant Clashes
Clash530	60d7d430-05c3-42a3-9	10687	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.131 m Serious Clashes
Clash531	60d7d430-05c3-42a3-9	10610	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.041 m Irrelevant Clashes
Clash532	60d7d430-05c3-42a3-9	10629	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.155 m Irrelevant Clashes
Clash533	60d7d430-05c3-42a3-9	10610	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.052 m Irrelevant Clashes
Clash534	60d7d430-05c3-42a3-9	10682	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.131 m Serious Clashes
Clash535	3df76403-f5f5-497a-9a	11024	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.007 m Irrelevant Clashes
Clash536	60d7d430-05c3-42a3-9	10658	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.206 m Serious Clashes
Clash537	60d7d430-05c3-42a3-9	10610	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m Irrelevant Clashes
Clash538	60d7d430-05c3-42a3-9	10643	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.062 m Irrelevant Clashes
Clash539	3df76403-f5f5-497a-9a	11024	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.007 m Irrelevant Clashes
Clash540	60d7d430-05c3-42a3-9	10658	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.289 m Serious Clashes
Clash541	60d7d430-05c3-42a3-9	10630	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.175 m Serious Clashes
Clash542	3df76403-f5f5-497a-9a	11024	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.007 m Irrelevant Clashes

Clash544	60d7d430-05c3-42a3-9	10610	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.077 m Irrelevant Clashes
Clash545	60d7d430-05c3-42a3-9	10679	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.012 m Irrelevant Clashes
Clash546	89d2b365-bf62-438e-b	11014	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.007 m Irrelevant Clashes
Clash547	60d7d430-05c3-42a3-9	10642	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.200 m Serious Clashes
Clash548	89d2b365-bf62-438e-b	11014	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.007 m Irrelevant Clashes
Clash549	60d7d430-05c3-42a3-9	10641	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.131 m Serious Clashes
Clash550	60d7d430-05c3-42a3-9	10610	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.066 m Irrelevant Clashes
Clash551	60d7d430-05c3-42a3-9	10679	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m Irrelevant Clashes
Clash552	60d7d430-05c3-42a3-9	10680	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.012 m Irrelevant Clashes
Clash553	45b96ffc-b703-403f-b5	10695	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.148 m Irrelevant Clashes
Clash554	60d7d430-05c3-42a3-9	10610	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.027 m Irrelevant Clashes
Clash555	60d7d430-05c3-42a3-9	10623	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.094 m Irrelevant Clashes
Clash556	60d7d430-05c3-42a3-9	10647	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.007 m Irrelevant Clashes
Clash557	45b96ffc-b703-403f-b5	10695	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.040 m Irrelevant Clashes
Clash558	60d7d430-05c3-42a3-9	10683	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m Irrelevant Clashes
Clash559	60d7d430-05c3-42a3-9	10605	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.044 m Irrelevant Clashes
Clash560	60d7d430-05c3-42a3-9	10637	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.009 m Irrelevant Clashes
Clash561	60d7d430-05c3-42a3-9	10669	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m Irrelevant Clashes
Clash562	60d7d430-05c3-42a3-9	10683	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.120 m Irrelevant Clashes
Clash563	60d7d430-05c3-42a3-9	10601	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m Irrelevant Clashes
Clash564	60d7d430-05c3-42a3-9	10669	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.017 m Irrelevant Clashes
Clash565	60d7d430-05c3-42a3-9	10645	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.020 m Irrelevant Clashes
Clash566	b6fde0f5-776f-422a-a2	10715	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.104 m Irrelevant Clashes
Clash567	60d7d430-05c3-42a3-9	10669	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.007 m Irrelevant Clashes
Clash568	60d7d430-05c3-42a3-9	10619	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.070 m Irrelevant Clashes
Clash569	60d7d430-05c3-42a3-9	10643	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.316 m Serious Clashes
Clash570	60d7d430-05c3-42a3-9	10686	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.356 m Serious Clashes
Clash571	60d7d430-05c3-42a3-9	10612	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.043 m Irrelevant Clashes
Clash572	45b96ffc-b703-403f-b5	10695	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.123 m Irrelevant Clashes
Clash573	60d7d430-05c3-42a3-9	10641	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.042 m Irrelevant Clashes
Clash574	60d7d430-05c3-42a3-9	10660	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.146 m Irrelevant Clashes
Clash575	60d7d430-05c3-42a3-9	10686	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.081 m Irrelevant Clashes
Clash576	b6fde0f5-776f-422a-a2	10716	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.036 m Irrelevant Clashes

Clash578	60d7d430-05c3-42a3-9	10636	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.034 m Irrelevant Clashes
Clash579	60d7d430-05c3-42a3-9	10636	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.034 m Irrelevant Clashes
Clash580	60d7d430-05c3-42a3-9	10629	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.057 m Serious Clashes
Clash581	60d7d430-05c3-42a3-9	10602	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.108 m Irrelevant Clashes
Clash582	60d7d430-05c3-42a3-9	10680	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.118 m Irrelevant Clashes
Clash583	60d7d430-05c3-42a3-9	10635	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.009 m Irrelevant Clashes
Clash584	60d7d430-05c3-42a3-9	10635	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.034 m Irrelevant Clashes
Clash585	60d7d430-05c3-42a3-9	10681	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m Irrelevant Clashes
Clash586	45b96ffc-b703-403f-b5	10695	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.123 m Irrelevant Clashes
Clash587	60d7d430-05c3-42a3-9	10629	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.057 m Serious Clashes
Clash588	60d7d430-05c3-42a3-9	10630	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.053 m Serious Clashes
Clash589	60d7d430-05c3-42a3-9	10658	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.088 m Irrelevant Clashes
Clash590	45b96ffc-b703-403f-b5	10695	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.123 m Irrelevant Clashes
Clash591	60d7d430-05c3-42a3-9	10685	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.106 m Serious Clashes
Clash592	9e343347-e3b6-48ba-8	10812	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.029 m Irrelevant Clashes
Clash593	9e343347-e3b6-48ba-8	10812	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.159 m Serious Clashes
Clash594	9e343347-e3b6-48ba-8	10783	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.022 m Serious Clashes
Clash595	9e343347-e3b6-48ba-8	10836	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.076 m Irrelevant Clashes
Clash596	9e343347-e3b6-48ba-8	10783	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.100 m Irrelevant Clashes
Clash597	9e343347-e3b6-48ba-8	10836	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.222 m Irrelevant Clashes
Clash598	9e343347-e3b6-48ba-8	10783	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.100 m Irrelevant Clashes
Clash599	9e343347-e3b6-48ba-8	10848	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.238 m Irrelevant Clashes
Clash600	9e343347-e3b6-48ba-8	10783	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.227 m Irrelevant Clashes
Clash601	9e343347-e3b6-48ba-8	10849	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.252 m Serious Clashes
Clash602	9e343347-e3b6-48ba-8	10810	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.029 m Irrelevant Clashes
Clash603	9e343347-e3b6-48ba-8	10850	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.113 m Serious Clashes
Clash604	9e343347-e3b6-48ba-8	10807	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.204 m Serious Clashes
Clash605	3df76403-f5f5-497a-9a	11026	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.078 m Irrelevant Clashes
Clash606	9e343347-e3b6-48ba-8	10810	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.159 m Irrelevant Clashes
Clash607	9e343347-e3b6-48ba-8	10848	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.046 m Irrelevant Clashes
Clash608	3df76403-f5f5-497a-9a	11028	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.010 m Irrelevant Clashes
Clash609	3df76403-f5f5-497a-9a	11025	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.046 m Irrelevant Clashes
Clash610	3df76403-f5f5-497a-9a	11026	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.078 m Irrelevant Clashes

Clash612	9e343347-e3b6-48ba-8	10807 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.240 m	Serious Clashes
Clash613	3df76403-f5f5-497a-9a	11027 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.240 m	Serious Clashes
Clash614	9e343347-e3b6-48ba-8	10801 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.253 m	Serious Clashes
Clash615	9e343347-e3b6-48ba-8	10848 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.046 m	Serious Clashes
Clash616	9e343347-e3b6-48ba-8	10837 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.076 m	Serious Clashes
Clash617	9e343347-e3b6-48ba-8	10855 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.228 m	Serious Clashes
Clash618	3df76403-f5f5-497a-9a	11028 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.208 m	Serious Clashes
Clash619	9e343347-e3b6-48ba-8	10833 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.076 m	Irrelevant Clashes
Clash620	9e343347-e3b6-48ba-8	10856 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.228 m	Serious Clashes
Clash621	9e343347-e3b6-48ba-8	10837 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.230 m	Serious Clashes
Clash622	9e343347-e3b6-48ba-8	10854 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.165 m	Serious Clashes
Clash623	9e343347-e3b6-48ba-8	10854 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.253 m	Serious Clashes
Clash624	9e343347-e3b6-48ba-8	10833 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.326 m	Serious Clashes
Clash625	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.102 m	Serious Clashes
Clash626	89d2b365-bf62-438e-b	11006 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.264 m	Serious Clashes
Clash627	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.155 m	Serious Clashes
Clash628	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.207 m	Serious Clashes
Clash629	9e343347-e3b6-48ba-8	10831 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.169 m	Serious Clashes
Clash630	89d2b365-bf62-438e-b	11007 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.010 m	Irrelevant Clashes
Clash631	3df76403-f5f5-497a-9a	11027 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.210 m	Serious Clashes
Clash632	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.246 m	Serious Clashes
Clash633	9e343347-e3b6-48ba-8	10847 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.010 m	Irrelevant Clashes
Clash634	9e343347-e3b6-48ba-8	10839 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.303 m	Serious Clashes
Clash635	3df76403-f5f5-497a-9a	11028 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.252 m	Serious Clashes
Clash636	9e343347-e3b6-48ba-8	10845 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.010 m	
Clash637	9e343347-e3b6-48ba-8	10839 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.309 m	Serious Clashes
Clash638	9e343347-e3b6-48ba-8	10797 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.241 m	Serious Clashes
Clash639	3df76403-f5f5-497a-9a	11028 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.010 m	
Clash640	9e343347-e3b6-48ba-8	10830 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.331 m	Serious Clashes
Clash641	9e343347-e3b6-48ba-8	10846 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.240 m	Serious Clashes
Clash642	9e343347-e3b6-48ba-8	10845 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.215 m	Serious Clashes
Clash643	89d2b365-bf62-438e-b	11010 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.057 m	Irrelevant Clashes
Clash644	9e343347-e3b6-48ba-8	10845 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.010 m	Irrelevant Clashes

Clash646	9e343347-e3b6-48ba-8	10854 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.278 m	Serious Clashes
Clash647	9e343347-e3b6-48ba-8	10847 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.010 m	Irrelevant Clashes
Clash648	9e343347-e3b6-48ba-8	10852 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.204 m	Serious Clashes
Clash649	9e343347-e3b6-48ba-8	10808 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.177 m	Serious Clashes
Clash650	9e343347-e3b6-48ba-8	10818 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.175 m	Serious Clashes
Clash651	9e343347-e3b6-48ba-8	10810 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.215 m	Irrelevant Clashes
Clash652	9e343347-e3b6-48ba-8	10844 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.265 m	Serious Clashes
Clash653	9e343347-e3b6-48ba-8	10862 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.236 m	Serious Clashes
Clash654	9e343347-e3b6-48ba-8	10812 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.215 m	Serious Clashes
Clash655	9e343347-e3b6-48ba-8	10847 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.239 m	Serious Clashes
Clash656	9e343347-e3b6-48ba-8	10864 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.201 m	Serious Clashes
Clash657	9e343347-e3b6-48ba-8	10844 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.112 m	Serious Clashes
Clash658	9e343347-e3b6-48ba-8	10811 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.204 m	Serious Clashes
Clash659	9e343347-e3b6-48ba-8	10812 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.126 m	Irrelevant Clashes
Clash660	9e343347-e3b6-48ba-8	10809 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.204 m	Irrelevant Clashes
Clash661	9e343347-e3b6-48ba-8	10809 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.215 m	Irrelevant Clashes
Clash662	9e343347-e3b6-48ba-8	10798 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.228 m	Serious Clashes
Clash663	9e343347-e3b6-48ba-8	10767 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.207 m	Serious Clashes
Clash664	9e343347-e3b6-48ba-8	10857 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.031 m	Irrelevant Clashes
Clash665	9e343347-e3b6-48ba-8	10808 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.121 m	Irrelevant Clashes
Clash666	9e343347-e3b6-48ba-8	10858 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.031 m	Irrelevant Clashes
Clash667	9e343347-e3b6-48ba-8	10757 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.240 m	Serious Clashes
Clash668	9e343347-e3b6-48ba-8	10806 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.153 m	Serious Clashes
Clash669	9e343347-e3b6-48ba-8	10767 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.010 m	Irrelevant Clashes
Clash670	9e343347-e3b6-48ba-8	10798 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.100 m	Irrelevant Clashes
Clash671	9e343347-e3b6-48ba-8	10776 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.179 m	Serious Clashes
Clash672	9e343347-e3b6-48ba-8	10795 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.236 m	Serious Clashes
Clash673	9e343347-e3b6-48ba-8	10830 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.216 m	Serious Clashes
Clash674	9e343347-e3b6-48ba-8	10816 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.074 m	Irrelevant Clashes
Clash675	9e343347-e3b6-48ba-8	10816 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.135 m	Irrelevant Clashes
Clash676	9e343347-e3b6-48ba-8	10854 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.236 m	Serious Clashes
Clash677	9e343347-e3b6-48ba-8	10855 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.132 m	Serious Clashes
Clash678	9e343347-e3b6-48ba-8	10837 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.162 m	Serious Clashes

Clash680	9e343347-e3b6-48ba-8	10836 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.162 m	Serious Clashes
Clash681	9e343347-e3b6-48ba-8	10831 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.313 m	Serious Clashes
Clash682	9e343347-e3b6-48ba-8	10800 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.236 m	Serious Clashes
Clash683	9e343347-e3b6-48ba-8	10830 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.286 m	Serious Clashes
Clash684	9e343347-e3b6-48ba-8	10833 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.062 m	Serious Clashes
Clash685	9e343347-e3b6-48ba-8	10809 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.169 m	Serious Clashes
Clash686	9e343347-e3b6-48ba-8	10786 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.057 m	Serious Clashes
Clash687	9e343347-e3b6-48ba-8	10768 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.225 m	Serious Clashes
Clash688	9e343347-e3b6-48ba-8	10798 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.189 m	Serious Clashes
Clash689	9e343347-e3b6-48ba-8	10776 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.265 m	Serious Clashes
Clash690	9e343347-e3b6-48ba-8	10815 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.265 m	Serious Clashes
Clash691	9e343347-e3b6-48ba-8	10798 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.200 m	Serious Clashes
Clash692	9e343347-e3b6-48ba-8	10844 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.225 m	Serious Clashes
Clash693	9e343347-e3b6-48ba-8	10860 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.331 m	Serious Clashes
Clash694	9e343347-e3b6-48ba-8	10813 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.303 m	Serious Clashes
Clash695	9e343347-e3b6-48ba-8	10778 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.224 m	Serious Clashes
Clash696	9e343347-e3b6-48ba-8	10781 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.214 m	Serious Clashes
Clash697	9e343347-e3b6-48ba-8	10780 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.179 m	Serious Clashes
Clash698	9e343347-e3b6-48ba-8	10780 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.225 m	Serious Clashes
Clash699	9e343347-e3b6-48ba-8	10816 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.228 m	Serious Clashes
Clash700	9e343347-e3b6-48ba-8	10786 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.075 m	Serious Clashes
Clash701	9e343347-e3b6-48ba-8	10787 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.075 m	Serious Clashes
Clash702	9e343347-e3b6-48ba-8	10788 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.075 m	Serious Clashes
Clash703	9e343347-e3b6-48ba-8	10794 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.225 m	Serious Clashes
Clash704	9e343347-e3b6-48ba-8	10783 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.100 m	Irrelevant Clashes
Clash705	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.147 m	Serious Clashes
Clash706	9e343347-e3b6-48ba-8	10786 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.050 m	Serious Clashes
Clash707	9e343347-e3b6-48ba-8	10795 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.228 m	Serious Clashes
Clash708	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.155 m	Serious Clashes
Clash709	9e343347-e3b6-48ba-8	10844 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.112 m	Serious Clashes
Clash710	9e343347-e3b6-48ba-8	10793 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.247 m	Serious Clashes
Clash711	3df76403-f5f5-497a-9a	11025 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.054 m	Irrelevant Clashes
Clash712	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.027 m	Irrelevant Clashes

Clash714	9e343347-e3b6-48ba-8	10812 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.057 m	Irrelevant Clashes
Clash715	9e343347-e3b6-48ba-8	10757 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.010 m	Irrelevant Clashes
Clash716	89d2b365-bf62-438e-b	11010 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.034 m	Irrelevant Clashes
Clash717	9e343347-e3b6-48ba-8	10854 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.165 m	Irrelevant Clashes
Clash718	9e343347-e3b6-48ba-8	10783 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.047 m	Irrelevant Clashes
Clash719	9e343347-e3b6-48ba-8	10839 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.271 m	Irrelevant Clashes
Clash720	9e343347-e3b6-48ba-8	10833 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash721	9e343347-e3b6-48ba-8	10767 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.010 m	Irrelevant Clashes
Clash722	9e343347-e3b6-48ba-8	10783 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.100 m	Irrelevant Clashes
Clash723	9e343347-e3b6-48ba-8	10830 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.057 m	Irrelevant Clashes
Clash724	3df76403-f5f5-497a-9a	11028 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.035 m	Irrelevant Clashes
Clash725	9e343347-e3b6-48ba-8	10783 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.100 m	Irrelevant Clashes
Clash726	9e343347-e3b6-48ba-8	10810 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.057 m	Irrelevant Clashes
Clash727	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.078 m	Serious Clashes
Clash728	9e343347-e3b6-48ba-8	10767 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.027 m	Irrelevant Clashes
Clash729	3df76403-f5f5-497a-9a	11028 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.010 m	Irrelevant Clashes
Clash730	9e343347-e3b6-48ba-8	10837 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash731	9e343347-e3b6-48ba-8	10855 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.212 m	Irrelevant Clashes
Clash732	3df76403-f5f5-497a-9a	11028 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.015 m	Irrelevant Clashes
Clash733	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.060 m	Irrelevant Clashes
Clash734	9e343347-e3b6-48ba-8	10808 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.177 m	Serious Clashes
Clash735	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.078 m	Irrelevant Clashes
Clash736	9e343347-e3b6-48ba-8	10776 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.099 m	Irrelevant Clashes
Clash737	9e343347-e3b6-48ba-8	10847 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.035 m	Irrelevant Clashes
Clash738	9e343347-e3b6-48ba-8	10786 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.075 m	Irrelevant Clashes
Clash739	9e343347-e3b6-48ba-8	10847 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.010 m	Irrelevant Clashes
Clash740	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.078 m	Irrelevant Clashes
Clash741	9e343347-e3b6-48ba-8	10798 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.017 m	Irrelevant Clashes
Clash742	9e343347-e3b6-48ba-8	10845 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.010 m	Irrelevant Clashes
Clash743	3df76403-f5f5-497a-9a	11026 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.078 m	Irrelevant Clashes
Clash744	9e343347-e3b6-48ba-8	10808 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash745	9e343347-e3b6-48ba-8	10798 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.100 m	Irrelevant Clashes
Clash746	9e343347-e3b6-48ba-8	10798 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.100 m	Irrelevant Clashes

Clash748	3df76403-f5f5-497a-9a	11028	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.010 m Irrelevant Clashes
Clash749	9e343347-e3b6-48ba-8	10839	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.041 m Irrelevant Clashes
Clash750	9e343347-e3b6-48ba-8	10845	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.030 m Irrelevant Clashes
Clash751	9e343347-e3b6-48ba-8	10845	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.010 m Irrelevant Clashes
Clash752	9e343347-e3b6-48ba-8	10847	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.059 m Irrelevant Clashes
Clash753	3df76403-f5f5-497a-9a	11028	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.035 m Irrelevant Clashes
Clash754	9e343347-e3b6-48ba-8	10788	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.075 m Serious Clashes
Clash755	3df76403-f5f5-497a-9a	11025	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.046 m Irrelevant Clashes
Clash756	89d2b365-bf62-438e-b	11007	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.035 m Irrelevant Clashes
Clash757	3df76403-f5f5-497a-9a	11028	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.028 m Irrelevant Clashes
Clash758	9e343347-e3b6-48ba-8	10845	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.010 m Irrelevant Clashes
Clash759	9e343347-e3b6-48ba-8	10850	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.014 m Irrelevant Clashes
Clash760	9e343347-e3b6-48ba-8	10848	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.053 m Irrelevant Clashes
Clash761	9e343347-e3b6-48ba-8	10845	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.035 m Irrelevant Clashes
Clash762	9e343347-e3b6-48ba-8	10847	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.010 m Irrelevant Clashes
Clash763	3df76403-f5f5-497a-9a	11028	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.066 m Irrelevant Clashes
Clash764	9e343347-e3b6-48ba-8	10847	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.035 m Irrelevant Clashes
Clash765	9e343347-e3b6-48ba-8	10783	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.084 m Irrelevant Clashes
Clash766	3df76403-f5f5-497a-9a	11026	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.042 m Irrelevant Clashes
Clash767	9e343347-e3b6-48ba-8	10783	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.094 m Irrelevant Clashes
Clash768	9e343347-e3b6-48ba-8	10836	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m Irrelevant Clashes
Clash769	89d2b365-bf62-438e-b	11007	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.021 m Irrelevant Clashes
Clash770	9e343347-e3b6-48ba-8	10847	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.067 m Irrelevant Clashes
Clash771	9e343347-e3b6-48ba-8	10848	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.050 m Irrelevant Clashes
Clash772	3df76403-f5f5-497a-9a	11028	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.071 m Irrelevant Clashes
Clash773	9e343347-e3b6-48ba-8	10845	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.054 m Serious Clashes
Clash774	9e343347-e3b6-48ba-8	10848	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.046 m Serious Clashes
Clash775	3df76403-f5f5-497a-9a	11026	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.082 m Serious Clashes
Clash776	9e343347-e3b6-48ba-8	10848	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.046 m Irrelevant Clashes
Clash777	9e343347-e3b6-48ba-8	10850	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.023 m Irrelevant Clashes
Clash778	89d2b365-bf62-438e-b	11006	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.068 m Irrelevant Clashes
Clash779	9e343347-e3b6-48ba-8	10848	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.044 m Irrelevant Clashes
Clash780	9e343347-e3b6-48ba-8	10848	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.046 m Irrelevant Clashes

Clash782	9e343347-e3b6-48ba-8	10845	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.056 m Irrelevant Clashes
Clash783	89d2b365-bf62-438e-b	11010	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.067 m Irrelevant Clashes
Clash784	9e343347-e3b6-48ba-8	10796	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.042 m Serious Clashes
Clash785	9e343347-e3b6-48ba-8	10767	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.053 m Irrelevant Clashes
Clash786	9e343347-e3b6-48ba-8	10912	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.197 m Serious Clashes
Clash787	9e343347-e3b6-48ba-8	10899	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.338 m Serious Clashes
Clash788	9e343347-e3b6-48ba-8	10913	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.283 m Serious Clashes
Clash789	9e343347-e3b6-48ba-8	10969	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.007 m Serious Clashes
Clash790	9e343347-e3b6-48ba-8	10946	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.250 m Serious Clashes
Clash791	9e343347-e3b6-48ba-8	10914	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.252 m Serious Clashes
Clash792	9e343347-e3b6-48ba-8	10916	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.305 m Serious Clashes
Clash793	89d2b365-bf62-438e-b	11004	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.191 m Serious Clashes
Clash794	9e343347-e3b6-48ba-8	10951	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.232 m Serious Clashes
Clash795	9e343347-e3b6-48ba-8	10886	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.183 m Serious Clashes
Clash796	9e343347-e3b6-48ba-8	10922	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.173 m Serious Clashes
Clash797	9e343347-e3b6-48ba-8	10969	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.169 m Serious Clashes
Clash798	8aeba149-5fa5-4900-b	11019	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.264 m Serious Clashes
Clash799	9e343347-e3b6-48ba-8	10924	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.159 m Serious Clashes
Clash800	9e343347-e3b6-48ba-8	10967	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.063 m Serious Clashes
Clash801	9e343347-e3b6-48ba-8	10970	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.288 m Serious Clashes
Clash802	8aeba149-5fa5-4900-b	11020	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.173 m Serious Clashes
Clash803	9e343347-e3b6-48ba-8	10967	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.013 m Irrelevant Clashes
Clash804	9e343347-e3b6-48ba-8	10967	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.112 m Irrelevant Clashes
Clash805	9e343347-e3b6-48ba-8	10924	ST-Concrete_Recta	Ducts	ME-Mitered_E	0.000 m Irrelevant Clashes
Clash806	8aeba149-5fa5-4900-b	11020	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.086 m Irrelevant Clashes
Clash807	9e343347-e3b6-48ba-8	10967	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.113 m Serious Clashes
Clash808	8aeba149-5fa5-4900-b	11020	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.187 m Serious Clashes
Clash809	9e343347-e3b6-48ba-8	10955	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.310 m Serious Clashes
Clash810	9e343347-e3b6-48ba-8	10920	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.189 m Serious Clashes
Clash811	9e343347-e3b6-48ba-8	10924	ST-Concrete_Recta	Ducts	ME-Mitered_E	0.000 m Irrelevant Clashes
Clash812	89d2b365-bf62-438e-b	10999	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.287 m Serious Clashes
Clash813	8aeba149-5fa5-4900-b	11020	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.038 m Irrelevant Clashes
Clash814	9e343347-e3b6-48ba-8	10973	ST-Concrete_Recta	Ducts	ME-Mitered_E	-0.189 m Serious Clashes

Clash816	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.189 m	Serious Clashes
Clash817	9e343347-e3b6-48ba-8	10936 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.167 m	Serious Clashes
Clash818	9e343347-e3b6-48ba-8	10960 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.064 m	Serious Clashes
Clash819	9e343347-e3b6-48ba-8	10926 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.176 m	Serious Clashes
Clash820	9e343347-e3b6-48ba-8	10960 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.064 m	Serious Clashes
Clash821	89d2b365-bf62-438e-b	11000 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.158 m	Serious Clashes
Clash822	9e343347-e3b6-48ba-8	10901 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.336 m	Serious Clashes
Clash823	9e343347-e3b6-48ba-8	10967 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.178 m	Serious Clashes
Clash824	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.036 m	Irrelevant Clashes
Clash825	9e343347-e3b6-48ba-8	10896 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.185 m	Serious Clashes
Clash826	9e343347-e3b6-48ba-8	10973 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.109 m	Irrelevant Clashes
Clash827	9e343347-e3b6-48ba-8	10900 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.251 m	Serious Clashes
Clash828	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.176 m	Serious Clashes
Clash829	9e343347-e3b6-48ba-8	10964 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.286 m	Serious Clashes
Clash830	9e343347-e3b6-48ba-8	10978 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.186 m	Serious Clashes
Clash831	9e343347-e3b6-48ba-8	10930 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.209 m	Serious Clashes
Clash832	9e343347-e3b6-48ba-8	10925 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.336 m	Serious Clashes
Clash833	9e343347-e3b6-48ba-8	10965 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.193 m	Serious Clashes
Clash834	9e343347-e3b6-48ba-8	10933 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.101 m	Serious Clashes
Clash835	9e343347-e3b6-48ba-8	10953 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.108 m	Serious Clashes
Clash836	9e343347-e3b6-48ba-8	10902 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.356 m	Serious Clashes
Clash837	9e343347-e3b6-48ba-8	10895 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.040 m	Serious Clashes
Clash838	9e343347-e3b6-48ba-8	10895 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.292 m	Serious Clashes
Clash839	9e343347-e3b6-48ba-8	10961 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.308 m	Serious Clashes
Clash840	9e343347-e3b6-48ba-8	10903 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.378 m	Serious Clashes
Clash841	9e343347-e3b6-48ba-8	10934 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.101 m	Serious Clashes
Clash842	9e343347-e3b6-48ba-8	10947 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.108 m	Serious Clashes
Clash843	9e343347-e3b6-48ba-8	10934 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.064 m	Serious Clashes
Clash844	9e343347-e3b6-48ba-8	10949 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.108 m	Serious Clashes
Clash845	9e343347-e3b6-48ba-8	10928 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.169 m	Serious Clashes
Clash846	9e343347-e3b6-48ba-8	10955 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.349 m	Serious Clashes
Clash847	9e343347-e3b6-48ba-8	10975 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.228 m	Serious Clashes
Clash848	9e343347-e3b6-48ba-8	10921 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.335 m	Serious Clashes

Clash850	9e343347-e3b6-48ba-8	10976 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.178 m	Serious Clashes
Clash851	a5560965-c421-436d-8	11018 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.023 m	Irrelevant Clashes
Clash852	9e343347-e3b6-48ba-8	10917 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.238 m	Serious Clashes
Clash853	9e343347-e3b6-48ba-8	10927 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.176 m	Irrelevant Clashes
Clash854	9e343347-e3b6-48ba-8	10950 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.108 m	Serious Clashes
Clash855	9e343347-e3b6-48ba-8	10928 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.101 m	Irrelevant Clashes
Clash856	9e343347-e3b6-48ba-8	10896 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.035 m	Irrelevant Clashes
Clash857	9e343347-e3b6-48ba-8	10976 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.154 m	Serious Clashes
Clash858	9e343347-e3b6-48ba-8	10932 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.273 m	Serious Clashes
Clash859	9e343347-e3b6-48ba-8	10877 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.103 m	Serious Clashes
Clash860	9e343347-e3b6-48ba-8	10962 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.343 m	Serious Clashes
Clash861	9e343347-e3b6-48ba-8	10981 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.341 m	Serious Clashes
Clash862	9e343347-e3b6-48ba-8	10885 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.075 m	Irrelevant Clashes
Clash863	9e343347-e3b6-48ba-8	10957 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.325 m	Serious Clashes
Clash864	9e343347-e3b6-48ba-8	10929 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.101 m	Serious Clashes
Clash865	9e343347-e3b6-48ba-8	10885 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.078 m	Irrelevant Clashes
Clash866	9e343347-e3b6-48ba-8	10954 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.108 m	Serious Clashes
Clash867	9e343347-e3b6-48ba-8	10930 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.101 m	Serious Clashes
Clash868	9e343347-e3b6-48ba-8	10885 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.140 m	Serious Clashes
Clash869	9e343347-e3b6-48ba-8	10982 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.308 m	Irrelevant Clashes
Clash870	9e343347-e3b6-48ba-8	10932 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.101 m	Serious Clashes
Clash871	9e343347-e3b6-48ba-8	10877 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.124 m	Serious Clashes
Clash872	9e343347-e3b6-48ba-8	10905 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.182 m	Serious Clashes
Clash873	9e343347-e3b6-48ba-8	10917 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.076 m	Irrelevant Clashes
Clash874	9e343347-e3b6-48ba-8	10918 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.076 m	Irrelevant Clashes
Clash875	9e343347-e3b6-48ba-8	10917 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.194 m	Serious Clashes
Clash876	9e343347-e3b6-48ba-8	10918 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.076 m	Irrelevant Clashes
Clash877	9e343347-e3b6-48ba-8	10884 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.070 m	Irrelevant Clashes
Clash878	9e343347-e3b6-48ba-8	10917 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.200 m	Serious Clashes
Clash879	9e343347-e3b6-48ba-8	10962 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.199 m	Serious Clashes
Clash880	9e343347-e3b6-48ba-8	10957 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.215 m	Serious Clashes
Clash881	9e343347-e3b6-48ba-8	10912 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.215 m	Serious Clashes
Clash882	9e343347-e3b6-48ba-8	10887 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.215 m	Serious Clashes

Clash884	9e343347-e3b6-48ba-8	10896 ST-Concrete_Recta Ducts	ME-Mitered_E	0.000 m	Irrelevant Clashes
Clash885	9e343347-e3b6-48ba-8	10895 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.215 m	Serious Clashes
Clash886	9e343347-e3b6-48ba-8	10954 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.404 m	Serious Clashes
Clash887	9e343347-e3b6-48ba-8	10966 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.337 m	Serious Clashes
Clash888	9e343347-e3b6-48ba-8	10899 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.197 m	Serious Clashes
Clash889	9e343347-e3b6-48ba-8	10947 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.363 m	Serious Clashes
Clash890	9e343347-e3b6-48ba-8	10905 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.102 m	Serious Clashes
Clash891	89d2b365-bf62-438e-b	11003 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.294 m	Serious Clashes
Clash892	9e343347-e3b6-48ba-8	10906 ST-Concrete_Recta Ducts	ME-Mitered_E	-0.102 m	Serious Clashes
Clash893	9e343347-e3b6-48ba-8	10969 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.007 m	Irrelevant Clashes
Clash894	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.003 m	Irrelevant Clashes
Clash895	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash896	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.086 m	Irrelevant Clashes
Clash897	9e343347-e3b6-48ba-8	10960 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.064 m	Irrelevant Clashes
Clash898	9e343347-e3b6-48ba-8	10967 ST-Concrete_Recta Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash899	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash900	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.064 m	Irrelevant Clashes
Clash901	9e343347-e3b6-48ba-8	10967 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.176 m	Irrelevant Clashes
Clash902	9e343347-e3b6-48ba-8	10969 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.026 m	Irrelevant Clashes
Clash903	9e343347-e3b6-48ba-8	10969 ST-Concrete_Recta Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash904	9e343347-e3b6-48ba-8	10930 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.089 m	Irrelevant Clashes
Clash905	9e343347-e3b6-48ba-8	10955 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.012 m	Irrelevant Clashes
Clash906	9e343347-e3b6-48ba-8	10951 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.080 m	Irrelevant Clashes
Clash907	89d2b365-bf62-438e-b	11000 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.158 m	Irrelevant Clashes
Clash908	9e343347-e3b6-48ba-8	10960 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.068 m	Irrelevant Clashes
Clash909	9e343347-e3b6-48ba-8	10895 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.379 m	Irrelevant Clashes
Clash910	9e343347-e3b6-48ba-8	10960 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.064 m	Irrelevant Clashes
Clash911	9e343347-e3b6-48ba-8	10932 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.089 m	Irrelevant Clashes
Clash912	9e343347-e3b6-48ba-8	10960 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.064 m	Irrelevant Clashes
Clash913	9e343347-e3b6-48ba-8	10927 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.201 m	Irrelevant Clashes
Clash914	9e343347-e3b6-48ba-8	10917 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.076 m	Irrelevant Clashes
Clash915	9e343347-e3b6-48ba-8	10976 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.176 m	Serious Clashes
Clash916	9e343347-e3b6-48ba-8	10918 ST-Concrete_Recta Duct Fittings	ME-Rectangula	-0.076 m	Irrelevant Clashes

Clash918	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.089 m	Serious Clashes
Clash919	9e343347-e3b6-48ba-8	10887 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.002 m	Irrelevant Clashes
Clash920	9e343347-e3b6-48ba-8	10884 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.095 m	Irrelevant Clashes
Clash921	9e343347-e3b6-48ba-8	10967 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.176 m	Serious Clashes
Clash922	9e343347-e3b6-48ba-8	10895 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.002 m	Irrelevant Clashes
Clash923	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.086 m	Serious Clashes
Clash924	9e343347-e3b6-48ba-8	10973 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.061 m	Irrelevant Clashes
Clash925	9e343347-e3b6-48ba-8	10906 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.102 m	Serious Clashes
Clash926	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.088 m	Irrelevant Clashes
Clash927	9e343347-e3b6-48ba-8	10884 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.070 m	Irrelevant Clashes
Clash928	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.198 m	Serious Clashes
Clash929	9e343347-e3b6-48ba-8	10885 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.075 m	Irrelevant Clashes
Clash930	9e343347-e3b6-48ba-8	10967 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.113 m	Serious Clashes
Clash931	9e343347-e3b6-48ba-8	10967 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m	Serious Clashes
Clash932	9e343347-e3b6-48ba-8	10967 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.063 m	Irrelevant Clashes
Clash933	9e343347-e3b6-48ba-8	10885 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.100 m	Irrelevant Clashes
Clash934	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.088 m	Irrelevant Clashes
Clash935	9e343347-e3b6-48ba-8	10885 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash936	8aeba149-5fa5-4900-b	11020 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.055 m	Irrelevant Clashes
Clash937	9e343347-e3b6-48ba-8	10982 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.015 m	Irrelevant Clashes
Clash938	9e343347-e3b6-48ba-8	10967 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.113 m	Irrelevant Clashes
Clash939	9e343347-e3b6-48ba-8	10967 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.176 m	Irrelevant Clashes
Clash940	9e343347-e3b6-48ba-8	10973 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash941	9e343347-e3b6-48ba-8	10924 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash942	9e343347-e3b6-48ba-8	10897 ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.006 m	Irrelevant Clashes
Clash943	9e343347-e3b6-48ba-8	10924 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash944	9e343347-e3b6-48ba-8	10897 ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.006 m	Irrelevant Clashes
Clash945	9e343347-e3b6-48ba-8	10969 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.007 m	Irrelevant Clashes
Clash946	9e343347-e3b6-48ba-8	10924 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash947	9e343347-e3b6-48ba-8	10924 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash948	9e343347-e3b6-48ba-8	10969 ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.027 m	Irrelevant Clashes
Clash949	9e343347-e3b6-48ba-8	10960 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.024 m	Irrelevant Clashes
Clash950	9e343347-e3b6-48ba-8	10969 ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.035 m	Irrelevant Clashes

Clash952	89d2b365-bf62-438e-b	11003	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.073 m	Irrelevant Clashes
Clash953	9e343347-e3b6-48ba-8	10896	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	0.000 m	Irrelevant Clashes
Clash954	9e343347-e3b6-48ba-8	10895	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.084 m	Serious Clashes
Clash955	9e343347-e3b6-48ba-8	10960	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.067 m	Irrelevant Clashes
Clash956	8aeba149-5fa5-4900-b	11019	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.023 m	Irrelevant Clashes
Clash957	9e343347-e3b6-48ba-8	10934	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.040 m	Irrelevant Clashes
Clash958	9e343347-e3b6-48ba-8	10969	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.031 m	Irrelevant Clashes
Clash959	8aeba149-5fa5-4900-b	11019	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.078 m	Irrelevant Clashes
Clash960	a5560965-c421-436d-8	11018	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.015 m	Irrelevant Clashes
Clash961	9e343347-e3b6-48ba-8	10896	ST-Concrete_Recta	Duct Fittings	ME-Rectangula	-0.103 m	Serious Clashes
Clash962	9e343347-e3b6-48ba-8	10960	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.060 m	Irrelevant Clashes
Clash963	9e343347-e3b6-48ba-8	10971	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.051 m	Irrelevant Clashes
Clash964	8aeba149-5fa5-4900-b	11019	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.086 m	Irrelevant Clashes
Clash965	9e343347-e3b6-48ba-8	10972	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.086 m	Irrelevant Clashes
Clash966	9e343347-e3b6-48ba-8	10924	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.095 m	Irrelevant Clashes
Clash967	9e343347-e3b6-48ba-8	10924	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.086 m	Irrelevant Clashes
Clash968	89d2b365-bf62-438e-b	11002	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.094 m	Irrelevant Clashes
Clash969	9e343347-e3b6-48ba-8	10966	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.097 m	Irrelevant Clashes
Clash970	9e343347-e3b6-48ba-8	10966	ST-Concrete_Recta	Flex Ducts	ME-Flex_Roun	-0.097 m	Irrelevant Clashes
Clash971	fe3a0b48-5c57-4269-9	4966	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.262 m	Legal Clashes
Clash972	fe3a0b48-5c57-4269-9	4966	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.210 m	Irrelevant Clashes
Clash973	bc93338f-9d08-4ad9-8	5016	AR-Floor_Finish_Ca	Pipes	PL-Opening Cu	-0.006 m	Irrelevant Clashes
Clash974	fe3a0b48-5c57-4269-9	4966	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.182 m	Legal Clashes
Clash975	bc93338f-9d08-4ad9-8	5017	AR-Floor_Finish_Ca	Pipes	PL-Opening Cu	-0.163 m	Legal Clashes
Clash976	fe3a0b48-5c57-4269-9	4966	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.231 m	Legal Clashes
Clash977	bc93338f-9d08-4ad9-8	5016	AR-Floor_Finish_Ca	Pipes	PL-Opening Cu	-0.006 m	Irrelevant Clashes
Clash978	fe3a0b48-5c57-4269-9	4966	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.353 m	Legal Clashes
Clash979	bc93338f-9d08-4ad9-8	5017	AR-Floor_Finish_Ca	Pipes	PL-Opening Cu	-0.001 m	Irrelevant Clashes
Clash980	fe3a0b48-5c57-4269-9	4966	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.065 m	Irrelevant Clashes
Clash981	bc93338f-9d08-4ad9-8	5017	AR-Floor_Finish_Ca	Pipes	PL-Opening Cu	-0.001 m	Irrelevant Clashes
Clash982	fe3a0b48-5c57-4269-9	4966	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.188 m	Irrelevant Clashes
Clash983	bc93338f-9d08-4ad9-8	5017	AR-Floor_Finish_Ca	Pipes	PL-Opening Cu	-0.087 m	Irrelevant Clashes
Clash984	fe3a0b48-5c57-4269-9	4966	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.183 m	Irrelevant Clashes

Clash985	bc93338f-9d08-4ad9-8	5017	AR-Floor_Finish_Ca	Pipes	PL-Opening Cu	-0.127 m	Irrelevant Clashes

Clash986	fe3a0b48-5c57-4269-9	4966	AR-Floor_Topping-5	Pipes	PL-Opening Cu	-0.262 m	Legal Clashes
Clash987	bc93338f-9d08-4ad9-8	5041	AR-Floor_finish-100	Pipes	PL-Opening Cu	-0.073 m	Irrelevant Clashes
Clash988	bc93338f-9d08-4ad9-8	5041	AR-Floor_finish-100	Pipe Fittings	PL-Coupling_G	-0.025 m	Irrelevant Clashes